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MECHANICS' MAGAZINE

Vol. VII—New Series No. 1. Vol. I.

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NEW-YORK

PUBLISHED BY THE EDITOR AND PROPRIETOR

K. MINOR, & G. C. F. RAFFER, 120 N. 3RD ST.

(By Stiles)

1851.

It is to be distinctly understood, that for the period of the present year, 1851, no numbers of the Journal will be published, and no subscription will commence until July, 1852.

And those who are desirous of receiving a subscription for the year 1852, are requested to send the price of the Journal, to the Editor, or to the Proprietor, at the place where the Journal is published, or to the Editor, or to the Proprietor, at the place where the Journal is published, or to the Editor, or to the Proprietor, at the place where the Journal is published.



TO SUBSCRIBERS

In consequence of the suspension, for several months, of its publication, the present, or *Seventh* volume, will be commenced on the 1st of July—instead of January, 1838; and the work will hereafter form *two* volumes each year.

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Those indebted for *past* volumes are especially called upon to pay the amount due, or the work will not be continued to them after the sixth number of this volume.

The *MECHANICS' MAGAZINE*, heretofore published as a separate work, will from this date be united with the *Railroad Journal*, and the publication will hereafter bear the title of *RAILROAD JOURNAL AND MECHANICS' MAGAZINE*, and be forwarded to those who have paid for the *Mechanics' Magazine* to a period subsequent to July 1, 1837, until they shall have received as many months of this, as they paid for that work—or until otherwise ordered, if paid for in advance.

The terms are *Five Dollars per annum, in advance.*

[The following articles were in type, but omitted in their proper places for want of room—they will be embodied in our next number.]

New Railroad Route between Easton and New York.

[The following communication from Mr. L. F. Douglass in regard to the Mine Brook Railroad and Transportation Co. will be found worthy of attention. From this it would appear to be a better route than any yet proposed for the Transportation of Coal to this city and vicinity. What will our friend *Clinton* say to this—will it not meet his views? Few routes can present so desirable an opportunity for capitalists; we wish that all interested in the cause of Internal Improvements should look to it.]

In conformity with the provision made in a charter granted by the Legislature of New-Jersey, under the name of the Mine Brook Railroad and Transportation Company, at its Session of 1836 and '37—the exploration of the route, which was entrusted by the Commissioners to the subscriber, has been completed, which commences upon the line of the

New-Jersey Railroad, either at Newark or Elizabeth Town, in Essex Co., and thence passing in almost a direct line through Springfield, Reading Ridge, Germantown, Clinton, &c. in the rich counties of Somerset, Hunterdon, and Warren, terminates at Easton, Pa.

From this examination, a more favorable result has been obtained than the most sanguine of its friends were led to expect. The distance from the Hudson to the Delaware rivers will be under 70 miles—maximum grade not to exceed 48 feet per mile—the most abrupt curvature is 1000 feet radius, and this very seldom occurs, not generally running below 1000 feet. These considerations, so indispensable to the successful prosecution of heavy transportation, cannot, I am confident, be embraced in any other route proposed or in contemplation between the city of New-York and Easton; and I hazard nothing in the prediction, that whatever course a Railroad may traverse in connecting the two points contemplated, this east and west eventually be occupied as the great channel of communication between these two points.

The Susquehanna and Delaware Railroad commences at Pittston on the Susquehanna, and running east, strikes the Delaware at the Water Gap—from thence by an extension of its charter they are at liberty to continue the line as far as Easton. This project has been partially progressed in, the exploration of the route having been made, and a large part of the capital stock subscribed; and it is the intention of that Company to proceed with the undertaking as soon as arrangements can be completed for that purpose. By a connection with this, or other existing and proposed lines, an entire Railroad communication may be had to the Susquehanna, passing in its course through the rich and inexhaustible coal mines of Luzerne, and striking upon the Susquehanna at a point that will inevitably ensure a participation in its extensive trade. From this point, following the line of communication already either in operation or in contemplation to be made, will extend this important improvement to the line of the Erie Railroad.

As the Report of the Engineer, which is now under way and will shortly appear, will enter more largely into the investigation of the particular routes to be adopted from Easton, with the detail in connexion, it was not thought advisable in this notice to anticipate its appearance with a particular description of its facilities.

There are many considerations in this proposed improvement which claim for it, and will receive the attention of your citizens.

L. F. DOUGLASS, *Eng. Mine Brook R. R. & Tran. Co.*

June 6, 1838.

The suggestions in the following extract are very good.

While writing, may I suggest to you what I think will be an advantage both to your subscribers that may wish to avail themselves of the advantages of the labor-saving inventions, and to the inventors of such machines; and that is, in your publication or notice of them, inform us who manufactures them—where the inventor resides—his post-office—what agents he has (if any) in the sea-port towns, and the manufacturer's price. I would readily avail myself of several useful machines, noticed in your *Mechanics' Journal*, did I know how to procure them. To apply to a person residing a great distance from a sea-port, even at such a place as Albany, is not only inconvenient, but in many cases impracticable, both in the application and in the forwarding the machine. Every invention

proven to be useful, or possessed of advantages that speak for themselves, should be placed within the reach of every citizen who may desire to possess them; and to do this, there should be an agent fixed in each or more sea-ports, from whence they can be readily sent. To apply to the interior of a State for a small machine is out of the question with us here; and I think you would benefit some of the numerous inventors, were you to suggest in your periodical the advantage they would derive from selling their inventions at a moderate and reasonable price, that would induce many to buy, who now refuse on account of the high price, particularly new and unestablished inventions.

Curtis's Railway Chairs.

The form of the rail *a*, and chair *c*, as shown in Fig. 1, is the same as those now in use; but the space for the key is made rounding in the middle, as shown in Fig. 3.

Fig. 1.



Fig. 3.

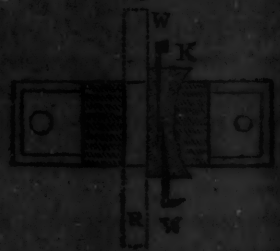


Fig. 2.

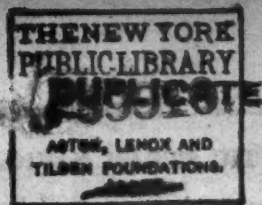


Fig. 4.



When the rail is in its place, a piece of straight grained oak, *k*, is driven into the key-way, and then folding wedges, *w*, with claw heads, are driven both sides into the oaken key; thus, the wood becomes violently compressed, and adapts itself to all the conditions of the rail and chair; and for the joint chairs, it will make no difference what may be the variations or twist in the two rails, as the wooden key will, in every case, adapt itself to circumstances, the wedges are drawn back by a hot hammer, when it is necessary to take up a rail; this method will hold a rail much more steadily than either an iron or wooden key solely; the shake or jar produced by the train passing over the rails, will not affect the wedges, and they will always remain tight, particularly if care be taken to drive in the wooden keys, when they are dry, the elasticity also of the timber admits of driving the wedges tight, without breaking the chairs; it is thus clear, that the rails of every railway, of whatever figure they may be, can be secured in this manner without any difficulty; in fact, this method is not only better, but cheaper than that usually adopted.

Fig. 1 is an end view; Fig. 2 a plan. Fig. 3 a plan showing the form of the key-way and key when the wedges are driven; Fig. 4, side view.



AMERICAN
RAILROAD JOURNAL
AND
MECHANICS' MAGAZINE.

No. 1, Vol. I.
New Series.]

JULY 1, 1838.

[Whole No. 313.
Vol. VII.]

TO SUBSCRIBERS.

THE present is the first number of a new volume, and with it we commence a new series, in its present form, and in semi-monthly numbers.

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ATLANTIC STEAM NAVIGATION.

SELDOM has it fallen to our lot to congratulate our readers upon an event of more importance than the safe arrival of two fine English Steamers.

One of these, the *Sirius*, sailed from Cork on the 4th of April, and reached our harbor on the 23d, after a trifling detention at Sandy Hook. Scarcely had our citizens received the intelligence of her arrival, when the *Great Western* came in, on the same day, having left Bristol on the 7th.

Lieut. Hosken, the Commander of the *Great Western*, having made arrangements for her reception, while on a visit to the United States for that purpose, and the probable time of departure of both vessels having been announced in our papers, public expectation was on tiptoe for some time. Our citizens forgot every thing else, and talked only of steam vessels. The impossibility of the passage having been confidently asserted, and attempted to be proved, by men of some note, on the other side of the Atlantic, there was doubt and anxiety in the minds of those not accustomed to study such matters. When the long looked for vessels came, public opinion turned decidedly in favor of the practicability of the passage, nothing having occurred to furnish the slightest ground for uneasiness or alarm, during the trip of either of the vessels; although, the weather being adverse, a severe test of the capability of the steamers was afforded.

To the Commander of the *Sirius*, Lieut. Roberts, R. N., is due the honor of having brought across the Atlantic the first English Steam Packet. This vessel, at present chartered by the company for which she sails, is intended to ply between this port and Cork, only until their great vessel, the *British Queen*, is completed.

Though the *Sirius* is not so large as the last named vessel, still she is of respectable capacity registering about 700 tons. She is sharp, and of a good model for sea use. Her wheel houses are the only projections from her flush sides. She has a comfortable cabin of moderate size, but very neatly arranged and ornamented. Carrying two masts of schooner rig, she can, when necessary, make good use of her sails.

It is of her machinery, however, that we have most to say. The massive character of all that belongs to this department, is immediately noticed by our citizens, who are not accustomed to see such liberal use made of iron.

The engines are after the usual model of English Marine Steam Engines—acting vertically and from a cross head down upon the walking beam (which is nearly level with the bottom of the cylinder), the crank is therefore worked from beneath.

The whole of this is firmly braced and supported by massive iron beams,

and secured to a bed plate of great size and weight. By these means, the machinery is rendered compact and firm in itself, without depending upon the strength of the vessel, which may strain ever so much without in the slightest manner affecting the working of the engines, so long as the frame and bed plate are unbroken. In the most violent storm at sea, therefore, the motion is as true and easy as in a river way. The portion of the machinery under the deck is far superior to the arrangement attempted in some of our sea-going boats.

The cylinders of the *Sirius* are about 6 feet in diameter, while the length of stroke is $7\frac{1}{2}$ feet. This vessel is the first in which we have seen Hall's condensers—with the principle of which our readers are well acquainted from descriptions in the various works on the Steam Engine. By means of this apparatus none but fresh water is supplied to the boilers; the condensed steam, and that which escapes from the safety valves, is returned through the condenser to the boiler, while the small quantity lost by leakage, &c., is replaced by water from a small distillatory apparatus. Great advantages are said to be derived from the use of Hall's Condensers. The proprietor names the following:—The saving in fuel, said in some instances to amount to one-third—the preservation of the boilers, and the time saved in cleaning them—the increase of power derived from the greater perfection of vacuum, the small force required in pumping, and the perfect preservation of the valves of the air-pump—and, lastly, the economy in the size of the boiler, owing to its more perfect condition. Besides these, there are other advantages growing out of the use of various contrivances of Mr. Hall, which are said to greatly increase its adaptation to the navigation of the ocean.

Any saving in fuel will, of course, act with immediate advantage upon the navigation of the Atlantic. It may be thought by some that the saving in fuel mentioned above, is exaggerated; in answer to this, it will only be necessary to remind the reader of the immense waste incurred in blowing out hot water.

We are informed by a gentleman who examined the condensing tubes of the *Sirius*, that they were in perfect order, and free from any deposit; the boilers from any crust, and the water from any quantity of salt sensible to the taste.

The engines of the *Sirius* are 320 horse power—we are not informed as to the consumption of coal.

The *Great Western*, commanded by Lieut. Hosken, R. N., is altogether the finest vessel ever seen upon our waters, both as regards elegance of finish, and massiveness of machinery. We pretend not to give our readers a picture of this beautiful vessel—but merely a few dimensions, from which they may be able to ascertain the scale upon which it should be drawn.

Imagine a black ship of 1340 tons—the size of a large man of war—240 feet in length, sharp and trim in the bows, with a round stern of exceedingly graceful curvature—a rounding projection on her sides before the wheel, not inaptly compared to the sides of a large whale—with four schooner-rigged masts, and one immense smoke pipe—and you have the outline of the *Great Western*. On passing over her sides, her deck appears a little world of itself. A fine deck cabin affords a lounging room, and sleeping accommodations for a number of passengers. Through this, and from the open deck are entrances to the main cabin or saloon, the finest apartment we have ever seen afloat; and except by a certain fixedness of its furniture, hardly to be distinguished from the habitations of *terra firma*. No cabin was ever known so high, airy, or finely finished. Parris, the fashionable painter, has decorated the panels with his pencil, while artists of skill in every department, have contributed their share to the decorations of this floating palace. The style of ornament is that of Louis XIV, giving a light and airy, though exceedingly rich appearance to the apartment. The length of this cabin is 82 feet, while a recess on either side gives an extreme breadth in one part of 34 feet. A small additional cabin or ladies' room is also richly ornamented. There is also a fore cabin 46 feet long—affording, with the others, about 130 berths for passengers, with 20 or 30 for their servants. There are also suitable accommodations for the officers, while a comfortable top-gallant fore-castle furnishes ample quarters for the men.

The Engines, built by Messrs. Maudslay, Sons & Field, are of the most massive character and beautiful finish; presenting a truly splendid specimen of British art. These engines are also after the model of English Marine Steam Engines, and all the remarks made in regard to strength, durability, and firmness, while speaking of the *Sirius*, are still more applicable in this place. The immense beams supporting and connecting the machinery and ponderous masses of iron, are gracefully wrought into gothic arches and columns. The engine room has abundant space for all moving operation, and every thing in and about it is of metal. Some idea of the solidity of the work may be formed from the fact that each paddle shaft weighs $6\frac{1}{2}$ tons, and the intermediate shaft $4\frac{1}{2}$ tons.

These engines are rated at 225 horse power each—the cylinders are $73\frac{1}{2}$ inches in diameter, the length of stroke about $7\frac{1}{2}$ feet. The boilers are 17 feet deep and contain 100 tons of water. They are four in number, and firmly secured, though without contact with each other or with the sides of the vessel; and are so entirely surrounded with metal as to defy danger from fire.

There is a peculiarity in the wheels of both these vessels, worthy at least of the attention of our builders, if not of their imitation. The

wheel is that patented by Galloway, and owned, as improved, by Morgan. It goes indifferently by the name of either. It is well known, that the patent as first taken out, was for a feathering wheel, the paddle boards being made to *enter* the water perpendicularly, and retaining at every point of their revolution the same direction to *emerge* from the water perpendicularly. The great saving of power, and other advantages attendant upon such a motion, are obvious to every one, but the difficulties arising from the complicated mechanism were so great, as to prevent the successful introduction of the wheel, as first patented. The form was changed—the paddle boards were fixed upon the arms, but each board was divided into three parts, and these were placed at an angle with the arm and parallel to each other, like a Venetian blind. The paddle boards being permanent, there is no more difficulty in keeping them in order than those used with us. It is this wheel that is used in the Great Western and Sirius. The ease with which the wheels move is very evident; the Great Western does not splash and lift near so much as our smallest boats. The introduction of this contrivance into our steamboats is greatly to be desired—we shall refer to the subject in a future number.

At an entertainment given on board of the Great Western, by the Commander and Consignee, in behalf of the owners, several of our most distinguished citizens were present, and bore testimony to the success of the experiment. Among these were the Hon. Daniel Webster, Gov. Mason, of Michigan, Luther Bradish, ex-Speaker of the House of Assembly, as well as most of our municipal officers.

We have seldom seen so much enthusiasm and good feeling as was shown upon this occasion. Among others, James Buchanan, Esq., the British Consul, addressed the company. He alluded to the rapid transit from Bristol to this city, and hence by railroad to the Mississippi. Gov. Mason also referred to the same subject. John Ridge, a Cherokee Chief, in an elegant address, set forth the situation of his people and the influence of modern improvements upon them. From his distant home beyond the Mississippi, a few days would bring him to join in festivity with those who have almost as recently left England.

The healths of Lieut. Hosken and of Lieut. Roberts were drank with great enthusiasm, as were also many other toasts.

Several of the passengers came forward, and testified to the excellence of the vessel, the superiority of her machinery, and the courteousness of her commander.

Lieut. Hosken took advantage of the opportunity to explain in regard to the injustice that had been done, by scandalous reports circulated before the Great Western left England—even the story of her having been burned to the water's edge was told, to prevent persons from taking passage. Lieut. Hosken invited the strictest scrutiny into the condition

of the machinery, &c. Any one was at liberty to examine the state of the worst of the four boilers. The passengers had been allowed every opportunity of witnessing the performance of the engines, and determining for themselves the merits of the case. Lieut. H. also explained, that the machinery was new, had never made but a short trip on the Thames and around to Bristol—that still everything had worked well, though laboring under the disadvantage of a heavy sea at starting, and which continued for several days. No delay however, occurred, except altering a few screws in the bearings to relieve the friction, which occupied but a few minutes—and when advantage was taken of a favorable spell to tighten the paddle boards, as these are numerous, this occupied two hours—with this exception, and when the *South America* was spoken, the engine was kept constantly at work.

A very gratifying announcement was made by Lieut. Hosken, viz., that the experience of the voyage would enable himself and officers to accomplish a saving of one-fourth of the fuel consumed in a given time.

It was also stated that invitations had been given to several officers of our navy, to accompany the *Great Western* on her trip out, and that furlough had been granted them for that purpose.

It would be useless for us to attempt to describe the sensation created by the arrival of these vessels—thousands crowded to see them, and tens of thousands to witness their departure.

The obvious advantages to be derived from a speedy passage between this and England, have been immediately seized upon in various quarters, and extensive arrangements are now being made dependent upon Atlantic Steam Navigation.

We need only remind our readers of the immense number of letters to be carried—the greater security in the consummation of mercantile transactions—and the very great saving in the interest of transported specie, to open to their view a wide field of contemplation.

We have neither space nor time to pursue the subject—in our next we shall give further information.

PATENT SAFETY FUZE.

We call the attention of Engineers, and others, engaged in public works, to the advertisement of the *Patent Safety Fuze*, which is found on our cover. The increased safety and certainty of its operation render it highly important. We have heard it highly praised by an Engineer, who having had much blasting to do under water, had an excellent opportunity for testing it. In dry work it is also far superior to the ordinary priming—there being no needle to be withdrawn, time is saved,

no danger is incurred, and there is a certainty of their discharge. We daily hear of the loss of life by careless blasting; much, if not all of this, might be prevented by the use of the Safety Fuze.

The Manufacturers are confident as to the value of the article, and have, in every instance, submitted it to the severest trial.

The same article is used in England, and by some extensive contractors, to the exclusion of every other thing of the kind. They speak highly of its safety and certainty—items richly repaying them for the small additional expense of the Fuze as sold in England. It is afforded here at an exceedingly small rate, and only wants to be tried to become universally used.

Relative Value of the different kinds of Steam, from different Liquids, as a Moving Power. By J. A. ROEBLING, Civil Engineer.

IN considering steam as a mechanical agent, it is natural to enquire which kind of steam requires the least application of heat to produce a certain effect? This question occurred to me, when I was reading the substance of two Lectures on the Steam Engine, delivered by Dr. Lardner before the Liverpool Mechanic's Institute. Dr. Lardner's remarks, referring to the subject, are as follows:—

“When all those great effects are attained by the mere fact of our availing ourselves of the simple physical effect of converting water into vapor and back again, we naturally say, where there is so large a field and so many different substances, from which the effect may be produced, should we not expect from the large advances which are making in the generalization of their principles, that this effect may be produced from other substances? Water possesses several properties, which render it the most hopeless and unfit for such an experiment. In order to convert it into vapor, we of course apply heat. The least promising liquid is that which requires the largest application of heat; and of all liquids water consumes the largest quantity of heat, requiring nearly 1000° to raise it from a boiling state to a state of vapor; therefore, *a priori*, a philosopher would say, try spirits of wine, or a thousand other things, but do not try water, for this special reason.”

So far, the Doctor. I hardly need to mention, that when other liquids in place of water are substituted, condensers, constructed on the principle of Hall's, are to be used. For Locomotives similar condensers could be contrived, where the cooling surfaces are kept cool, by a constant stream of fresh air, produced by an airfan, provided the steam used is of little specific heat.

It is unknown to me, whether Dr. Lardner has made any satisfactory experiments which have enabled him to test the relations of the different kinds of steam, and he does not quote the experiments of other philosophers which would justify the above supposition. This subject has been a matter of serious reflection with me, and since I believe that Dr. Lardner's notion is erroneous in this respect, and because his opinion might entertain the hopes of many who believe that the steam engine is capable of great improvement in this respect, I offer my views to the public, and I shall feel indebted to any one, who, by actual experiments

and well-ascertained facts will be enabled to correct my statements, or to refute them altogether.

Being seriously engaged in improving and extending the use of steam, principally to agriculture, it is of great importance to me, whether the bulky weight attending the use of water and coal in Locomotive or Marine Engines, can be greatly reduced or not, by the application of another liquid in place of water. My remarks, however, are confined to the use of Steam, and to the Steam Engine on the common principle, and when heat is applied. I am well aware, and I have good reasons myself to believe, that Dr. Lardner's predictions, regarding the supersession of steam by other natural powers, will be realized sooner or later. - Before this however is done, it will be well to exert our reflecting faculties in improving the application of steam power as much as it is capable of improvement.

Water requires about 1000° of heat to be converted from the boiling state into vapor of one atmospheric pressure. This quantity of heat is absorbed by the water, without being raised in its temperature, as far as the temperature has any effect on the thermometer. This absorbed, but not sensible heat, is called *latent* heat, or *specific* heat; and this heat serves to expand the liquid and to increase its volume many fold. When the liquid is not confined, but boiling in an open vessel, and when the barometer is at 28 Parisian inches, and the air in a moderately dry state, then the water cannot absorb more than about 1000° of heat, and the generated vapor will rapidly expand. When the boiling water is confined, it will absorb more heat than 1000°, and the steam generated in the vessel will acquire a greater specific heat, but it will at the same time become proportionably denser, or specifically heavier, and in consequence of this, it will require a greater expansive force; such steam is called *high steam*.

Steam of the temperature of boiling water has not exactly the same expansive force as the atmospheric air, as is commonly believed. It is a natural law that the different gases and steams penetrate without removing each other, and without effecting a mutual pressure; hence, the steam rising from boiling water is not repelled by the pressure of the atmospheric air. The steam is only repelled by those vapors of the same nature, which are already diffused in the air. Only the gases and vapors of the same nature repel each other by a mutual expansive pressure. The expansive force of the rising steam, therefore, depends on the expansive force of that portion of steam already in the air, and the pressure of which must be overcome. This property of the steam is mentioned by the way, having no strict reference to my subject.

The specific density, now, and the expansive force of steam is depending on its temperature; but the temperature, specific heat, or density, is very different in different kinds of steam of the same pressure raised from different liquids. According to the experiments of Mr. Despretz, water requires in the boiling state, for being converted into vapor of one atmospheric pressure, a quantity of heat very near to . . . 970°

Alcohol requires	373
Vitriol Ether requires	164
Sulphur Alcohol requires	145
Spirits of Turpentine requires	137

The same quantity of water requires, therefore, 2.6 times as much heat as the same quantity of Alcohol, and seven times as much heat as the same quantity of Spirits of Turpentine requires for being converted

into vapor of the same pressure. There is the ostensible reason why Dr. Lardner recommends the substitution of other liquids in place of water.

According to the experiments of some eminent philosophers, when the specific weight of atmospheric air is put equal to 1.0000

The specific weight of the low steam of water is equal to 0.6235

The steam of Alcohol, 1.6133

The steam of Spirits of Turpentine, 5.0130

The steam of Alcohol, therefore, is 2.6 times as heavy, and that of Spirits of Turpentine about 8 times as heavy as the steam of water.

From this it appears, and it is ascertained by a number of experiments, that any fluid, when in a boiling state, requires the less heat for being converted into vapor, the greater the specific weight or the density of its steam is, or the less the steam becomes expanded. Water, when evaporated, will greatly increase its volume, and all the vapors of Alcohol, Spirits of Turpentine, or other liquids, will relatively fill volumes very near proportionally to their specific weight or density. Now, since water, when evaporated, will expand about 1700 times, the steam of Alcohol will expand 655 times, and that of Spirits of Turpentine will only expand 213 times. For producing a certain mechanical effect, now, we want the *same voluminous quantity* of steam of the *same pressure*; the steam may be raised from water, Alcohol, or Spirits of Turpentine. The above statements show, that the *same voluminous quantity* of steam of the same pressure, raised from any liquid whatever, always requires the same quantity of heat, or very nearly so; hence it follows, that there will be no saving of fuel in substituting any other liquid in place of water.

That liquid will be the most economical and advantageous, which, as steam, expands most: Water, therefore, will be preferable to Alcohol, and Alcohol will be preferable to Spirits of Turpentine; because of the former a less quantity is required than of the latter for producing a certain effect. Besides this, water is cheapest.

I know of no experiments, by which the expansion of the steam of Alcohol, Spirits of Turpentine, &c. had been ascertained by actual measurement; and in the case some have been made, I should like to be informed of it, and whether the results have been found at variance or not with the above deductions.

Saxenburgh, Butler Co. Pa.

Interesting Account of the Operation of Cram's Pile Driving and Cutting Machine.

To the Editors of the Railroad Journal.

Syracuse, April 11, 1838.

GENTLEMEN,—The work on this Road is progressing very favorably. The line of the road being, for the whole distance, in the immediate neighbourhood of the long level upon the Erie Canal, is very favorable.

It is intended to found the road upon piles for about 29 miles. This occurs over level tracts of low, soft land, where the piles are driven from 8 to 12 feet, and being cut off near the surface, they present a uniform and perfect grade.

The manner of driving them is new and highly interesting. The work

is done by a steam engine, which raises two heavy cast-iron hammers; elevating them about 30 feet. The piles driven, stand lineally 5 feet apart, and are in two lines under the rails; of course, the distance of the two roads apart, is the proposed width of the track. The machine moves upon the piles that it has driven. In front, between the two hammers and the leaders in which they run, is a circular saw of 40 inches diameter. This saw is regulated in height by screws, and runs in a plane corresponding with the grade of the road. After the two piles are driven to a sufficient depth, the saw is set in motion, and being pressed by an iron rod against one pile, it cuts it off with great force and rapidity; and is readily, by a slight effort, swung against the pile upon the other side, which is in like manner cut off. The work of levelling the saw, and cutting off the piles, is rapidly performed. A flat iron bar is then laid across these two piles, a piece of cast iron rail taken up from behind the machine, on each side, and carried forward to the two last piles sawed off, and rested upon them and the next pile back. Upon this the whole machine is easily rolled forward five feet; when with a pair of grappling hooks at the end of ropes running upon sheaves at the top of the leaders, a pile is taken up at any distance within 60 feet of the machine, and brought at once to its place, properly elevated, between the leaders, and the bearers which have been before raised and fastened, are let down upon them, striking about eight blows per minute.

The machine in operation near this place is worked by a rotary engine from the shop of Messrs. Elam Lynds & Son, and is now driving piles from 24 to 28 feet deep, driving one upon the top of another, or double piles.

The company have four of them upon the road distributed along upon the different piling sections. Each machine is operated successfully by eight men, and will in fair average weather and circumstances, drive about a mile of road in a month.

The height at which the piles are sawed off, is regulated as often as required by the levelling instrument, and furnish as perfect a grade as is possible to make. The piles are not less than 12 inches in diameter at the large end, and are necessarily very substantial. The superstructure is laid upon them, consisting first of a cross tie of the best white cedar, 4 by 12, laid flatwise, and then a pine rail 8 inches square. The iron bars are to be laid upon the centre of the rails, on oak ribbons two inches thick. It would be difficult to find any way in which eight men could grade a mile of railroad in a month so perfectly as this is done. The frost, it is supposed will not raise them, and therefore the repairs upon such a road are necessarily slight. The grade of the road will be filled up about them principally from the side ditches.

The only question about them is, as to their durability, and should they last no longer than the common duration of timber, it is a most economical mode of forming the grade in the first instance, leaving the embankments to be made deliberately, and full time to settle. Besides they would decay but a small distance into the ground for many years, when they might be cut off and another one rested upon them. But we are well convinced, *here*, that we can make them endure for any reasonable period, by salting them. It is intended to put a considerable quantity of salt into the head of each pile, and to calculate for as frequent a renewal of the supply of salt as may be deemed necessary. That salt will completely preserve timber from decay, no matter how exposed, has been satisfactorily shown here, in many instances. I lately noticed an

instance that had occurred in Herkimer County, where a correspondent of Judge Buel, of the Cultivator, says, that in the spring of 1822, he set some *saved hemlock* fence posts, one-half he salted by boring a hole a little above the ground diagonally, and filling it with salt, and then plugged it to exclude the air and water.

In the spring of 1830 (eight years), the parts *not salted* were all entirely decayed below the surface of the ground. The salted parts are all now standing (January 10, 1838), and to appearance may stand years longer. The piles upon which the salt rails here are founded, though small and driven by hands, do not decay, nor does the post raise them so as to affect the rails. I have the most entire confidence in their being preserved by the use of salt. This will, then, be the cheapest and most durable kind of railroad that can be constructed, and in the continuous prairies of the western country, if timber can be found, will be the plan upon which to build their roads.

Many gentlemen have examined the operations of our machines, and have expressed a uniform approbation of the principle. It was patented to Captain Smithe Cram, to whom, and E. P. Williams, now in the employ of this Company, the patent belongs.

These machines, and their operations, can be examined easily during the ensuing summer, as they will be worked at short distances from the Canal, and much of the time in sight of it.

Very respectfully, yours,

JOHN WILKINSON.

Long Island Railroad.

[We are glad to hear again from S. D. The communication has been on hand some time, but has not lost its value. Always impressed with the importance of the continuation of the Long Island Railroad, we deem the present time the very best in which to direct attention and interest to it.]

To the Editors of the Railroad Journal.

Boston, March 20, 1838.

GENTLEMEN,—There is one class of society for which railways may be said to be peculiarly made; a class whose immense daily increase is, perhaps, one effect of the mechanical discoveries which distinguish this age from all others; and that is, the class of men of business, properly so called; that is, of men of business habits, of men of method. As profits become moderate, liable to less fluctuation, peace being every day more valued—as new countries become peopled, and sudden and unlooked for and violent means of rising to eminence or riches cease to exist, such men must increase; and according as civilization extends, and the value of knowledge not as a means of display, but as a means of return is understood, method being one great arm of all such knowledge, such men must increase; and the habit once formed will border upon scrupulousness. To such men, and all men living for a constant object, *railways* will become the favorite mode of conveyance; it will be the mode—when perfected, as it is not now in this country—and the only mode, on which they can rely with some security, on which they can calculate to hours and minutes; which, unlike steamboats, or canals, or ordinary roads, is in a great measure independent of the contingencies of

wind and weather, of fogs, of frosts, or of freshets—how much more so, at least, than any other means of conveyance, must be palpable to every one. This mode, therefore, will become the stay of such men—they will find it their interest to suggest it; the other modes may occasionally equal, probably, never surpass it. But the other modes will be desultory in their rates, sometimes rapid, sometimes slow—not to be regularly depended on—interrupting far more the schemes and plans, rules and arrangements, and expectations and predictions of business men—they will always continue more or less erratic in their returns, from their very nature, and they will in their best times, unless no other mode of conveyance presents itself, be especially supported by the erratic, and the luxurious, and migratory of the community; a race sufficiently happy and delightful to mix with, but not the race which governs the mainsprings of industry and enterprise, and upon which all great transactions ultimately depend.

I have been led just now to these expressions, however common-place, while considering the interruption to the steamboat navigation of the Sound this season, when the extreme mildness of the weather might have led us, this time, to expect an exception. The interruption to the travel between Boston and New-York is, it will be admitted, a great drawback. It has occurred more or less every season since I, who have not long however attended to the navigation, can remember. These cities are therefore somewhat estranged during the winter—they shake hands in summer, and in winter their energies are comparatively dormant—were they nearer each other, or in more constant and certain communication, which is the same thing, would not their strength be united, at least, far more so than now. This leads me naturally to advert to the long-talked of Long Island Railroad, which it seems has been commenced, at any rate, though in what way, at present I am unable to say, but let that be as it may, I look upon this road when completed, as reducing vastly the difficulty which is experienced during the winter season, in moving between, or forwarding any thing between these cities; and not less, the uncertainty which exists more or less at all seasons—this uncertainty during the opening and summer months, is to a merchant nearly as annoying as the entire interruption occasioned every winter. There would still remain a portion of the Sound to be navigated, even were the road completed; to wit, between Greenport, or that neighbourhood, and Stonington; but it would ill become us to despise the advantage which upwards of 100 miles of land communication presents over as much sea, because we cannot realize a perfect communication. With the aid of some additional lights, the remaining navigation, or the ferry as it might be termed, would be but rarely interrupted. Familiarity with the passage, with the tides, and with the ground, would render the crossing even during foggy weather sufficiently safe, though it might not be so rapid—we should have escaped the Hurlgate, the place where the ice first accumulates, and first interrupts the trade; and the probability of interruption would be reduced during the most stormy seasons to a sheltered passage, for either side of Plum Island might be taken, on a distance of 26 miles. But the increased certainty as to time, not to dwell on the corresponding economy—the reliance which could be placed on the arrivals within an hour, is a benefit which I am inclined to value very highly, even admitting that an occasional non-arrival did occur in winter. The ferry at Stonington is the only point on the route where (excepting accidents) time can be lost, and here the loss of time would rarely exceed half an hour—an

hour's additional time, at any rate, would be a great allowance on so short a distance. We should then be able to accomplish the whole route between New-York and Boston in eleven hours with ease. If I were to take advantage of the occasional rapidities of the Stonington and the Boston Roads, I should say ten, but eleven would be a fair average. We might calculate daily with great safety on the arrivals within twelve hours. Our calculations at present, unless in midsummer, are very little to be depended on.

While there is much to be said in favor of the completion of the Long Island Railroad, and the advantages which it would offer to the inhabitants of the two greatest cities in the Union, there can nothing be said in disparagement of the present means of communication by steamboats, which is not applicable to such conveyance every where. The evil adverted to is inseparable from the element on which they act. These steamboats have, probably, arrived very near perfection in their accommodations, in their civilities, and most of all in their rates of speed. They will always, probably, continue to be used for the conveyance of heavy goods, but the sooner the Long Islanders admit of our dispensing with their accommodations for passengers, the sooner will the public be entitled to add them to the list of its benefactors.

New-York, however, is relying at present too much on her immense natural advantages. She is supine and sluggish in this one respect—careless of public improvement for their own sake.

Very respectfully,

S. D.

Removal of the Sabine River Raft.

[We are much indebted to Lieut. Blanchard for the annexed account of the removal of obstructions in the Sabine River, by the force under the command of Major Belknap. It is interesting, as it shows at how small a cost great lengths of our western rivers can be rendered navigable, and open intercourse with immense tracts of country at present no better than a wilderness. Iron Steamboats should be used on the Sabine; it is, as far as we understand the character of the river, a most suitable place for their use. We should feel greatly obliged by any further notices of these improvements; their importance attracts much attention and interest in the progress made in them.—Eds. R.R.J.]

To the Editors of the Railroad Journal,

Camp on Lake Sabine, La., April 1, 1839.

GENTLEMEN,—As I have been engaged in a work of *improvement*, perhaps a short notice of it may be acceptable.

In July last, Major Belknap, 8d Regiment U. S. Infantry, left Fort Jessup, La., with two companies, and marched to the Sabine River, and encamped there until the last of September. The summer was employed in constructing boats for the descent of the river. In going down, the leaning trees and the snags were cut off, so that with a rise of three feet the river would be navigable. The river was fortunately very low, so

much so, that the boats, although light, were sometimes delayed a day in getting a few miles, but it was all the better for our object. From the town of Sabine, on the Texas side, which is about 20 miles below Gaines Ferry, to the *Raft*, a distance of about 200 miles, no obstructions were found to high water navigation, except the snags or leaning trees, which were removed. The *Raft* was formidable to look at, extending with intervals for a mile, but our active commander succeeded in making a clear passage through it, and it is now a good part of the river. From the *Raft* to the *Narrows* is a fine river, with few leaning trees and snags. The *Narrows* are about 50 miles from the mouth of the river, and are above 20 miles in extent. The river here branches into three forks, and as the name indicates each fork is very narrow, not exceeding 30 yards. The fork which we descended was crooked and blocked by falling and leaning trees, but we were successful in clearing a passage for our boats, and for steamboats. From the *Narrows* to the *Lake* there is a fine broad stream. By this operation the Government, at the slight expense of \$1200, has opened a navigation of 300 miles up the Sabine River, and it will have a beneficial influence on the rich lands bordering it. In proof of the complete success of this work of Major Belknap, I have to state that the Steamer *Velocipede*, Capt. J. Wright, burden 133 tons, 125 feet long, has lately ascended and descended the Sabine River, as far as the town of Sabine, from whence we commenced our operations, without the slightest injury to any part of her. The boat is too large for the river, but of course this proves the practicability of the navigation.

With respect, your obedient servant,

A. G. BLANCHARD, *First Lieutenant, 3d Infantry.*

Beet Root Sugar.

[We are favored with permission to publish the following letter. We are glad to see that our countrymen are taking hold of the matter in the right way. Bring it down to the use and practice of every farmer, and it will do well.—Eds. R. R. J.]

Boston, April 30, 1838.

DEAR SIR,—Some time since, Mr. Breck put into my hands a letter from you, enclosing copies of two letters received from England, detailing the fact of a patent having been taken out for the manufacture of Beet Sugar, by an improved process. Of course we are unable to conjecture what this new process is; but I have the pleasure to state to you, that a gentleman in this vicinity, after ten years' experimenting and close application to this business, has perfectly succeeded in discovering a method of obtaining the sugar, which promises great advantages. The following are some of the results, which may be safely calculated upon.

1. The Beet, a raw material, is so prepared that the manufacture can proceed at any season of the year most convenient.
2. Ten per cent. of good sugar can be obtained from the raw beet; or, in fact, all the sugar it contains, or that can be had by any process.
3. The sugar is obtained by a simple and not expensive method; and is a good article for use without being refined. I have sent a very small sample to-day to Jas. G. Birney, Esq., in New-York, and enclose you the remainder of what is in my possession, knowing the interest you take in

the subject. I should be very glad if it should come in your way, that you would show it to my friend, D. K. Minor, Esq., Railroad Journal Office, Wall street. The sample I send is a fine result.

4. The method requires little time, and no expensive machinery. Every farm house is already in possession of almost all that is necessary.

5. It can be produced at a rate which, at present prices of labor and sugar, is likely to pay one hundred per cent. profit.

6. The specifications are in the way of being sent to the Patent Office; and the right of manufacturing will probably be sold to our farmers, for perhaps ten dollars, or less.

I look upon this as a most important discovery, and I see at present no reason to question its success.

Respectfully, yours,

Anthony Dey, Esq.

HENRY COLMAN.

Genesee Valley Canal.

[The following letter from Mr. Mills, will give our readers some idea of the progress of an important State work—the Genesee Valley Canal.

—See advertisement on the cover.]

Rochester, May 3, 1838.

DEAR SIR,—I enclose you one of our Genesee Valley Canal notices of a letting.

When the work embraced in this notice is let, we shall have 52½ miles of Canal under contract, all of which (excepting locks No. 9 and 10, and the Genesee River aqueduct, which are to be done in the fall of the same season) is to be completed in the spring of 1840. The completion of the above work will furnish a canal navigation from Rochester to Mount Morris, a distance of 37 miles on the main line; and from Mount Morris to Dansville on the side cut, 15½ miles. It is designed to prepare the remaining 75 miles, extending from Mount Morris to the Allegany River, for contracting as soon as practicable. I have now two efficient parties of Engineers actively engaged in this service. The Canal Commissioners will definitively locate the line in the month of June, and in the course of the season put the larger portion, if not all of it, under contract. The whole work is to be pressed on vigorously until completed.

I am, very respectfully,

Yours, &c.

FREDERICK C. MILL.

Resolutions adopted by the President and Directors of the James River and Kanawha Company, on the 18th January, 1838.

Resolved, That the President and Chief Engineer be instructed, as soon as the season will permit, to cause the line of Canal from Lynchburgh to the Blue Ridge Canal, to be located and prepared for contract.

Resolved, That they cause also an accurate survey and estimate to be made of the line of Canal from the Eastern extremity of the Blue Ridge Canal to the town of Covington.

Resolved, That they also cause surveys and examinations to be made with a view to the best location of the Railroad from Covington to the Kanawha River, together with an estimate of the cost of the Railroad.

Resolved, That they cause surveys to be made of the line between Covington and the Falls of Kanawha, by the way of Dunlap's Creek, Forkrun, Howard's Creek, Greenbrier River and New River; the line by the way of the South Fork of Dunlap's Creek, Indian Creek, and New River; and the line down Second Creek from the point where the last mentioned line crosses the same, to Greenbrier River; and examinations to be also made, of the best lines leading from the valley of its principal tributaries, to Gauley River, together with such other surveys and examinations as may be deemed necessary to ascertain the most advantageous route for the Railroad.

Resolved, That they also cause a survey to be made of the Kanawha River, from the Falls to Point Pleasant, together with an estimate of the cost of the proposed improvement.

Resolved, That in making the surveys and estimates authorized by the five preceding resolutions, such parties, not exceeding four in number, and such agents in addition to those now in the service of the Company, as they may deem requisite and proper, may be employed.

Resolved, That the President and Chief Engineer be instructed to communicate fully and regularly with the Consulting Engineer, upon the subjects of the proposed surveys and estimates; and that they report to the Board from time to time the measures adopted and the progress of the surveys.

Resolved, That they be authorized to have provided for the use of the parties to be employed in the surveys, such outfits of instruments, boats, baggage waggons, and other apparatus as may be necessary to their proper equipment for the duties to be performed.—*Va. Statesman.*

Iron Steamboats.

[The following letter from Col. Lamar, of Savannah, to Mr. Haynes, we take from the Pittsburgh Gazette. We have long desired information relative to these boats—the notice of the first arrival of which we published long ago. The fact that they are in use in this country has not been generally known until quite recently.]

Savannah, March 27, 1838. »

To the Hon. Chas. E. Haynes, M. C. Washington:

DEAR SIR,—Yours, of the 20th inst., enclosing certain queries of the Hon. Mr. Biddle, of the committee on Manufactures, on the subject of Iron Steamboats, was received to-day; and it affords me pleasure to give all the information I have obtained in regard to them, at all times; but more especially, when it is probable that it will so actively promote the use of them in our country. The one I imported is fully described in the annexed circulars.—[These are the documents heretofore published in the Gazette]—She cost \$30,000 in 1834, exclusive of the duties which Congress remitted. Iron has since risen 50 per cent. in England, and there is great competition in that country for such boats, so that the cost is now 75 per cent. greater there than at that period. Nevertheless, two

have been imported since for this river—two more are ordered for it, and two more for the Altamaha, besides those of Mr. Butts, on which a remission of the duties is now asked of Congress. I do not reply to the queries in order, because the circulars furnish all that is desired, except as to cost, and the expenses of completing them in this country, regarding which I shall particularise. The last boat imported was built at Liverpool, in 1837; cost there £2,900 including rivets, and materials for putting her up in this country. The freight will be about \$800; and the completion, including deck and small cabin, about seven or eight thousand dollars; she weighs about 53 tons—is 115 feet long, 24 feet wide, and 8 feet hold—will draw, with a sixty horse engine, low pressure, boiler, and wood for 24 hours, (6 cords) not exceeding *thirty inches*, perhaps less. There is no necessity for bringing men to this country to put them up; any person who can strike a rivet can do the work. It is an improvement essential to the safety of life, as well as property, in the navigation of many of the rivers, but more particularly, the Mississippi. For, if provided with bulkheads, as those last imported are, they could not be sunk in snagging; because, only one interval could be filled with water at the time, and if further improved by a like extension over the boilers, and connected with those partitions with large pipes or apertures for the escape of the steam over the sides of the boat, they would be protected, too, against explosions of the boilers, which are so frequent and so fatal on that river. Once on the Mississippi, at a moderate cost, my reputation is pledged that none other will be used if iron can be had. They are peculiarly adapted to that navigation, and *will defy its sawyers and explosions*. The duties will be about \$2 80 per 100lbs. on the weight of them—a most onerous tax. I speak so freely because I am scarcely interested, at present, in any of those being imported. I sold mine at cost, and the purchasers would not take \$50,000 for her now; and they think she will be good fifty years hence.

Yours, &c.

G. B. LAMAR.

From the Papers of the Royal Engineers.

Notes on Concrete. By Lieutenant DENISON, Royal Engineers.

THE very general employment of the mixture of lime and gravel, commonly known by the name of concrete, in all foundations where, from the nature of the soil, precautions against partial settlements appear necessary; and the great probability of an extension of its use, in situations where the materials of which it is composed are easily and cheaply procured, must of course render it a subject of great interest to the engineer.

The paper which conveys most information on this subject, is a prize essay by Mr. G. Godwin, published in the 'Transactions of the Institute of British Architects.' In this essay, many instances are brought forward of the employment by the ancients, of a mixture analogous to concrete, both for foundations and for walls. Several cases are also mentioned in which, of late years, it has been used advantageously for foundations, by some of the most distinguished architects and civil engineers. In these latter instances, the proportion of the ingredients vary from one of lime and two of gravel, to one of lime and twelve of gravel, the

lime being in most cases Dorking lime, and the gravel Thames ballast.* The proportion, however, most commonly used now, in and about London, is one of lime to seven of ballast, though, from experiments made at the building of the Westminster new bridewell, it would appear that one of lime to eight of ballast made the most perfect concretion.

Concrete, compounded solely of lime and screened stones, will never assume a consistence at all equal to that of which sand forms a part. The north wing of Buckingham palace affords an instance of this. It was first erected on a mass of concrete composed of lime and stones, and when subsequent alterations made it necessary to take down the building, and remove the foundation, this was found not to have concreted into a mass.

Mr. Godwin states, as the result of several experiments, that two parts of stones, and one of sand, with sufficient lime, (dependant upon the quality of the material,) to make good mortar with the latter, formed the best concrete. As the quality of the concrete depends therefore on the goodness of the mortar composed of the lime and sand, and as this must vary with the quality of the lime, no fixed proportions can of course be laid down which will suit every case. The proportions must be determined by experiment, but in no case should the quantity of sand be less than double that of the lime. The best mode of compounding the concrete, is to thoroughly mix the lime, previously ground, with the ballast in a dry state; sufficient water being then thrown over it to effect a perfect mixture, it should be turned over at least twice with shovels, and then wheeled away instantly for use. In some cases, where a great quantity of concrete has to be used, it has been found advisable to employ a pug-mill to mix the ingredients: in every case it should be used hot.†

With regard to the quantity of water that should be employed in forming concrete, there is some difference of opinion: but as it is usually desirable that the mass should set as rapidly as possible, it is not advisable to use more water than is necessary to bring about a perfect mixture of the ingredients. A great change of bulk takes place in the ingredients of concrete when mixed together. A cubic yard of ballast, with the due proportion of lime and water, will not make a cubic yard of concrete. Mr. Godwin, from several experiments made from Thames ballast, concludes that the diminution is about one-fifth. To form a cubical yard therefore of concrete, the proportion of lime being one-eighth of the quantity of ballast, it requires about thirty cubic feet of ballast, and three and three quarters cubic feet of ground lime, with sufficient water to effect the admixture.

An expansion takes place in the concrete during the slaking of the lime; of which an important use has been made in the underpinning of walls,

* It is a question for consideration, whether a great variety of sizes in the materials used, would not form the most solid as well as the hardest wall. The walls of the fortress of Ciudad Rodrigo, in Spain, are of concrete. The marks of the boards, which retained the semifluid matter in their construction, are every where perfectly visible; and besides sand and gravel there are every where large quantities of round bolder stones in the wall, from four to six inches in diameter, procured from the ground around the city, which is every where covered with them.—*Lieutenant-Colonel Reid, Royal Engineers.*

† Mr. Godwin states, that the setting of ordinary lime results from the absorption of carbonic acid gas from the atmosphere. That the limes of mortars become sooner or later carbonates, is most certain, but there is no proof that this is the cause of their cohesion; indeed there is every reason to doubt it. It is more probable that new attractive properties are acquired at the moment that hydrates of lime are formed from calcined lime and water, when in close union with siliceous, aluminous, and some other substances, and that the properties first acquired at that time, do not cease immediately, but continue, if undisturbed, for ages.—*Lieutenant Colonel Reid.*

The amount of this expansion has been found to amount to about three-eighths of an inch to every foot in height, and the size thus gained, the concrete never loses.

The examples from which the above rules are deduced, are principally of buildings erected in or about London; the lime used is chiefly from Dorking, and the ballast from the Thames. It is very desirable that a more extended collection of facts should be made, that the proportions of the materials, when other limes and gravels are used, should be stated, in order that some certain rules may be laid down by which the employment of concrete may be regulated under the various circumstances which continually present themselves in practice.

The Dorking and Halling limes are slightly hydraulic. Will common limes, such as chalk, and common stone-lime, answer for forming foundations of concrete, where the soil, although damp, is not exposed to running water? Is it possible, even with hydraulic lime, to form a mass of concrete in running water? If common lime will not answer, may it not be made efficient by a slight mixture of cement? These, and questions similar to these, are of great interest; and facts which elucidate them will be valuable contributions to the stock of knowledge on this subject.

Description of the Method adopted by Mr. Taylor, for Underpinning with Concrete, the Storehouses in Chatham Dock-yard. By Lieutenant DENISON, Royal Engineers.

ONE of the large storehouses in Chatham dock-yard, having for some time exhibited serious defects in its walls, the attention of the Admiralty was directed to it in the year 1834, and Mr. Taylor, the civil engineer and architect, was directed to report upon the best mode of obviating the evil.

Upon investigation, the foundation of the storehouse, (a building 540 feet in length, and fifty in breadth,) was found to be in a very bad state; the front wall, nearest the river, had originally been built upon piles, while the rear wall was laid upon an upper stratum of five or six inch plank supported by two rows of transverse and longitudinal oak sleepers lying on the surface of the ground, which in this case was of a variable consistence, containing flints bedded in a sort of clay, quite pervious to the water, which at high tide rose some height upon the foundation. The sleepers, and heads of the piles at the front of the building, thus exposed to alternate moisture and dryness, were in a state of rapid decay; in some places they were even reduced to a powder; and it was possible for a man to move under the walls in the space previously occupied by the timber: in the rear, the case was pretty much the same; the sleepers were

* As all limes are soluble, more or less, in fresh water, this seems very doubtful. Any attempt to check a spring, or stop the course of running water with fresh concrete, will certainly fail. An instance of this was seen at Chatham, where Mr. Ranger was constructing a dock with his patent concrete: in the floor of the dock were several springs, which, in spite of every attempt to check them with concrete, continually made their way to the surface, and in every case it was found that the lime had been washed away from the mass, leaving only the gravel and sand behind. Eventually it was found necessary to carry away the water in an iron pipe, and discharge it into the drain outside the dock. Mr. Godwin states, that the dock at Woolwich failed from using separate moulded masses of concrete, instead of employing it as one whole. In this case, had separate masses been used, and laid in cement, the work might have been carried on, though it might perhaps have failed eventually, from the solubility of the lime in fresh water affecting the blocks.--W. D.

universally in a state of decay, but in some places were much further advanced towards decomposition than in others.

The state of the storehouse requiring immediate attention, it was resolved to attempt to underpin the walls, and this, Mr. Ranger, the patentee for the new description of concrete, or artificial stone, undertook to do, he having adopted a plan proposed by Mr. Taylor, for forcing the soft concrete against the under part of the wall; and he proceeded to execute his contract in the following manner.

I must premise, that the storehouse was vaulted underneath, and that the piers, or cross walls, required underpinning as much as any other part of the building.

The walls were laid open to their bottom, both inside and outside the building; in the front, the heads of the piles and the sleepers were removed for a depth of about four feet below the bottom of the wall, and for lengths of about five feet at one time. In the rear, all the planks and sleepers were removed for the same distance. A mass of concrete, composed of one-eighth of Halling lime, (reduced to a powder by grinding, and in a perfectly caustic state,) and seven-eighths of Thames ballast, mixed up with so much boiling water as to reduce the whole to a pasty consistence, was then thrown from a height of about fifteen feet underneath the wall: it was allowed to project about a foot on each side, where it was confined by planks, and after being roughly levelled, it was well rammed, to give it as much consistence as possible. This mass was raised about three feet, or to within one foot of the bottom of the wall; it was then carefully levelled and covered with half-inch slates. A kind of framework was then placed on the slates, consisting of two cross-plates of iron, placed perpendicularly to the direction of the wall, about one foot wide, and long enough to project about one foot on each side of the wall. To these were fixed two frames parallel to the wall, about four feet long, each carrying two sockets for screws. Within these frames were placed two moveable planks, long enough to pass just free between the cross-plates, and wide enough to fit nearly the space between the slates and the bottom of the wall. Upon these planks were sockets for the heads of the two screws, by which the planks were pushed forward, or withdrawn at pleasure.

When the apparatus was fixed, and the moveable planks ready on both sides of the wall, about two barrows-full of concrete, mixed as above, were thrown in from above; the workmen below then commenced turning the screws on each side simultaneously, moving the two planks towards the centre of the wall, and forcing the concrete before them into all the vacant spaces, and against the bottom of the wall. When the plank was forced forward as far as it could go, by the force of two men to each screw, the concrete was allowed to rest for about five or ten minutes, by which time it had set hard enough to stand by itself, and its expansion in the act of setting completed what the pressure of the screws might have left undone. The planks were then withdrawn, another charge thrown in on each side, and compressed as before and this was continued till the whole space between the frames was filled with concrete. The screws were then removed, the boards and frames unbolted and taken out, and lastly, the side-plates were withdrawn, leaving an interval of about three-quarters of an inch between each mass of concrete, which space was afterwards filled in with grout.

The above description is given from notes taken at the time. Mr Taylor has since published an account of the same work in the *Trans-*

actions of the Architectural Society, which does not differ materially from the above. The proportion of lime to gravel, he there states as one to six, and he brings forward more prominently the difficulties which were encountered, and the efficiency of the concrete in the mode in which it was applied. No settlement has taken place since the work was completed.

From the London and Edinburgh Philosophical Magazine.

On a large and very sensible Thermoscopic Galvanometer. By JOHN LOCKE, M. D., Professor of Chemistry in the Medical College of Ohio.

To Richard Taylor, Esq.

DEAR SIR,—The announcement of a new galvanometer will, perhaps, scarcely attract attention. But as I have been kindly encouraged by several eminent British philosophers to communicate some notice of my modification of the thermo-multiplier, I venture to send you the following sketch. Although a great labor has already been performed in electricity and magnetism, yet the adepts are aware that much remains to be executed, and that among the numerous principles already clearly established, it is probable that those proportions and arrangements which will produce the *maximum* effect have been in few instances fully ascertained. The chief novelty of the instrument which I am about to describe, consists in its proportions and the resultant effects. The object which I proposed in its invention was to construct a thermoscope so large that its indications might be conspicuously seen, on the lecture table, by a numerous assembly, and at the same time so delicate as to show extremely small changes of temperature. How far I have succeeded will in some measure appear by a very popular, though not the most interesting experiment which may be performed with it. By means of the warmth of the finger applied to a single pair of bismuth and copper disks, there is transmitted a sufficient quantity of electricity to keep an eleven-inch needle, weighing an ounce and a half, in a continued revolution, the connexions and reversals being properly made at every half turn.

The greater part of this effect is due to the *massiveness* of the coil, which is made of a copper fillet about fifty feet long, one-fourth of an inch wide, and one-eighth of an inch thick, weighing between four and five pounds. This coil is not made in a pile at the diameter of the circle in which the needle is to revolve, but is spread out, the several turns lying side by side, and covering almost the whole of that circle above and below. The best idea may be formed of the coil by the manner in which it is actually modelled by the workman. It is wound closely and in parallel turns on a circular piece of board eleven and a half inches in diameter, and half an inch in thickness, covering the whole of it except two small opposite "segments" of about 90 degrees each. The board being extracted leaves a cavity of its own shape to be occupied by the needle.

The copper fillet is not covered by silk or otherwise coated for insulation, but the several turns of it are separated at their ends by veneers of wood just so far as to prevent contact throughout. In the spreading out and compression of the coil, it is similar to Melloni's elegant

apparatus, though in my isolated situation in the interior of America; I was not acquainted with the structure adopted in his prior invention. In the *massiveness* of the coil my instrument is perhaps peculiar, and by this means it affords a free passage to currents of the most "feeble intensity," enabling them to deflect a very heavy needle. The coil is supported on a wooden ring furnished with brass feet and levelling screws, and surrounded by a brass hoop with a flat glass top or cover, in the centre of which is inserted a brass tube for the suspension of the needle by a cocoon filament. The needle is the double astatic one of Nobili, each part being about eleven inches long, one-fourth wide, and one-fortieth in thickness. The lower part plays within the coil and the upper one above it, and the thin white dial placed upon it, thus performing the office of a conspicuous index underneath the glass.*

I have not yet made any very extensive experiments with this instrument, being only just now prepared to do so. It is very sensible to a *single* pair of thermo-electric metals, to the action of which it seems peculiarly adapted; but the efficiency of such metals is increased by a repetition of the pairs, as in the thermo-pile of M. Melloni, especially if they be massive in proportion to the coil itself. With a battery of five pairs of bismuth and antimony, the needle was sensibly moved by the radiation from a person at the distance of 12 feet, without a reflector, the air being at the temperature of 72° .

In a recent interview with M. Melloni, to whose politeness I am much indebted, he expressed his opinion that with a thermo-pile massive in proportion to the coil, my galvanometer might be made to exhibit his thermo-experiments advantageously to a large class. Some idea may be formed of its fitness for this purpose from the result of a single trial on "transmission." The heat from a small lamp with a reflector, at the distance of five feet, passed through a plate of alum, and falling on a battery or pile of five pairs of bismuth and antimony deflected the needle only a fraction of one degree, but on substituting a similar plate of common salt, the same heat produced, by impulse, an immediate deflection of 33 degrees.

Although the instrument is finely adapted by its size for the purpose for which it was intended, class illustration, yet from the weight of the needle and the difficulty of bringing it to rest after it once acquires motion, it is not so suitable for experiments of research as the Mellonian galvanometer. When a massive thermo-pile, such as has lately been made by Messrs. Watkins and Hill of Charing cross, is connected with the coil and excited by a heat of about 200° , the needle being withdrawn, a distinct spark is obtained on interrupting the circuit; in producing this effect it is less efficient however than the ribboncoil of Professor Henry. The tube for suspension, placed over the centre of the instrument, is so constructed as to admit of being turned round by means of an index, which extends from it horizontally over the glass cover, and thus any degree of torsion may be given to the suspending filament or wire. A wire of any desired thickness may be easily substituted for the cocoon filament, when the instrument becomes adapted to measuring the deflecting forces of the galvanic battery. By using a thick wire it was ascertained that the calorimeter of Professor Hare having 40 plates, each 18 inches square, acted on the needle with a force equal to 92 grains, applied at the distance of 6 inches from the centre. In attempting to force the needle by torsion

* This instrument has been made by Messrs. Watkins and Hill, Opticians and Philosophical Instrument Makers, No. 5, Charing Cross.

into a line parallel to the coil, where the deflecting current acts with the greatest strength, I accidentally carried it too far and reversed its position, when instantly it became reversed in polarity, that which had been the north pole becoming the south. This showed how unfit is the magnetic needle to measure such a quantity of electricity as was then flowing through the massive conductor. The instrument is well adapted to show to a class the experiments upon radiant heat with Pictet's conjugate reflectors, in which the differential or air thermometer affords, to spectators at a distance, but an unsatisfactory indication. For this purpose the electrical element necessary is merely a disk of bismuth as large as a shilling, soldered to a corresponding one of copper, blackened, and erected in the focus of the reflector, while conductors pass from each disk to the poles of the galvanometer. With this arrangement the heat of a non-luminous ball at the distance of 12 feet will impel the needle nearly 180° , and if the connexions and reversals are properly made, will keep it in a continued revolution.

I have thus given you a brief sketch of an instrument which seems to supply a desideratum on the lecture-table, when the common thermometer is too small to afford to a class that direct and full satisfaction which, in a subject so important as that of heat, is very desirable to every professor. I have not, so far, attempted to use it extensively as an instrument of research, yet it shows evidently the importance of massiveness in conductors for feeble currents, such as those produced by thermo-combinations; nor am I certain that I have arrived at a maximum in this particular, for so far as I have proceeded in using thicker conductors for the coil, the deflecting effects have been increased. I am, &c.

London, Aug. 30, 1837.

JOHN LOCKE.

Report upon Dyeing Cloth with Prussian Blue. By MESSRS. MERLE, MALARTIC, PONCET, and Co., Saint Denis.

THE process of dyeing woollen goods with Prussian blue has particularly attracted the notice of chemists for the last twenty years. The experiments which have been made in this science, by Messrs. Ramond, Sonchon, Chevreul, and by one of our colleagues, M. Dumas, have completely resolved the scientific question of fixing Prussian blue upon wool. Some of these experiments have been made upon so great a scale, as to leave no doubt as to the practicability of its general application. The question is then to know, if dyeing with Prussian blue can sustain a competition with indigo, as regards price, beauty, solidity, and duration. It would, doubtless, be a great service rendered to the country, to be able to use advantageously, an article that may be easily made in all places and in all weathers, instead of a substance which is an exotic, and of a high price. Such a result would be well worthy of the rewards of the society. According to the testimony of your president, M. C. Baron Thenard, and by that of many other gentlemen of celebrity and good faith, who have worn cloths dyed by the Prussian blue of Messrs. Merle, Malartic, Poncet, and Co., this dyeing process wears at least as well as indigo; and the seams and other parts of the clothes that are exposed to continual friction do not become white, although the cloth is dyed in the piece. According to the report of the beauty of the color, the specimens

sent leave nothing to be desired. The reflection of the color gives a vivacity and purity of tone which is never met with in indigo dyes, particularly in the clear shade. The chemical experiments that have been made with these specimens, have proved that the dye has really Prussian blue for its base, that it contained no indigo, that it was decomposable by caustic alkalies, but that it resisted very well the action of acids and of chlorine. Your commissioners, who have visited the establishment of Messrs. Merle, Malartic, Poncet, and Co., at St. Denis, have found it arranged for working upon a large scale. They have there seen pieces of cloth in the course of manufacture, and others entirely finished. These pieces appeared to them to be of a very fine color, perfectly dyed, and the quality of the wool well kept. They have also been able to acquire proofs (by the register and correspondence that has been given to them) that this establishment works for commerce, and that business is carried on with many important houses in the cloth trade. In this state of things, the committee would have wished to be able to propose a reward of the first order, for Messrs. Merle, Malartic, Poncet and Co.; but these gentlemen wishing to keep for some time longer the secret of their application of dyeing, and the statutes of the society not allowing any reward to be granted, except to a perfect and complete communication of the whole process, your committee feel bound to make honorable mention of them, in order to reserve to them all their rights for a more important reward, when they shall deem it expedient to make their process known.—*Signea, Bussey Reporter, Bulletin de la Société d'Encouragement.*

*Siliceous and Calcareous products obtained by means of slow actions ;
Report by MM. GAY-LUSSAC and BECQUEREL, on a note of M. CAGNIARD-LATOUR.*

M. Cagniard-Latour states that by the means of several processes which he has devised, and which are dependent upon slow action, he has succeeded in forming various substances analogous to those which are found in nature. The following are some of the results which he has obtained.

"First Experiment.—Some lamp-black was treated with hot concentrated nitric acid; the liquor after having been poured off was exposed under a bell-glass for several months to the action of solar light; in proportion as the acid diminished, water or acid was added; by degrees siliceous concretions formed, some of which inclined to the pyramidal form. Analysis indicated two per cent. of carbon; these concretions submitted in a platina crucible to the action of caustic potash, heated by the flame of an alcohol-lamp, diminished in size; their hardness is sufficient to scratch rock crystal.

"Second Experiment.—Some of the bog iron (*fer limoneux*) of Berry was taken; after having reduced it to a very fine powder, was treated with hydrochloric acid; the solution was diluted with water and was filtered; it was next put into a large retort, and a glass capsule containing a piece of white marble was then suspended in it. The marble was gradually attacked, carbonic acid gas was disengaged; oxide of iron was deposited, and crystals several millimetres in length having the form and principal properties of felspar with a calcareous base.

Third Experiment.—Milk of lime (*lait de chaux*) was poured into a solution of perchloride of iron, to which had been added a brown infusion of roasted corn. The precipitate having been well washed in water, then mixed with this liquid; the mixture was heated in a kind of Papin's digester until the interior pressure amounted to eleven atmospheres; siliceous grains were precipitated produced from the milk of lime. The matter was then taken and re-dissolved anew in hydrochloric acid; the solution having been filtered, it was again filtered through chalk of Meudon, which had been passed through very fine cambric, by means of water, to separate the grains of quartz from it: Oxide of iron was deposited in the chalk. When the filtration was difficult, the liquor was acidulated. At the end of fifteen days the Meudon whitening was again strained through the cambric, and the part which had not passed was treated with hydrochloric acid; small opalescent siliceous concretions were obtained, of which several have the form of crowns and are split from the centre to the circumference; they are not fusible with the blowpipe and scratch glass; those which were colored being moderately heated, acquired a smoky tint in consequence of the organic matter which they contain.

Fourth Experiment.—125 grammes of powdered Meudon whitening were put into a glass tube about two inches in diameter, and four feet and a half in height; the lower part of the tube was then closed with a piece of linen rag intended to serve as a filter. Afterwards water was put into the tube, and the whitening was shaken so as to mix it well. After having completely filled up the tube with this water, some water very weakly acidulated with hydrochloric acid was prepared; and in proportion as the water first put into the tube filtered away through the whitening and the linen upon which it rested, acidulated water was poured into the tube. The filtered water deposited by degrees in a bottle in which it was received, crystalline grains of carbonate of lime; and at the same time the linen serving as a filter, became covered over a great part of its exterior surface with a crust which, examined with a magnifying glass, had the appearance of saccharoidal marble. The experiment lasted about three months. The quantity of whitening of Meudon which was dissolved during the time that the filtration continued was about 75 grammes, that is to say, a little more than the half of all the whitening which had at first been put into the tube."—*Comptes Rendus*, No. 25, June 1837.

New Carburets of Hydrogen, Rétinnapthé, Rétingle, Rétinole, and Métanaphtalène.

MM. Pelletier and Walter have examined the products obtained during the conversion of resin into gas for gas lights; the results are stated to be:

1st. The instant the resin falls into the red-hot cylinder there are formed with the gas a certain number of extremely hydrogenated compounds which have been separated by chemical analysis.

2nd. Among these substances there occur three new carburets of hydrogen, to which the author has given the names of *rétinnapthé*, *rétingle*, and *rétinole*; these are all liquid: there are two solid carburets of hydrogen, *naphtalène*, already known, and *métanaphtalène*, a new compound:

3rd. Rétinnapthe is a very light and volatile fluid; its composition determined by the density of its vapor, may be represented by $C^{2.2}H^{1.6}$. This product, M. Pelletier observes, is at least isomeric with one carburetted hydrogen, which is still hypothetical, but which appears to play a great part in the benzoic compounds, if indeed it be not itself this carburetted hydrogen; it gives rise to a series of new compounds.

4th. Rétingle is a new sesquicarburet of Hydrogen, which may be represented by the formula $C^{3.6}, H^{3.4}, H^{2.4}$ [?]; it is susceptible of conversion by the action of chlorine, bromine, and nitric acid, into compounds which exhibit a series of new combinations.

5th. Rétinole is a new bicarburet of hydrogen, the formula of which is $C^{6.4}H^{3.2}$; it differs from the bicarburetted hydrogen of Faraday $C^{2.4}H^{1.2}$, both in its constitution and its chemical properties.

6th. Métanaphtalene is a new substance, which differs from naphthalene in its properties, but isomeric with its composition. It is remarkable for its splendor and beauty, its chemical indifference, in which property it resembles paraffine, from which it differs totally in its properties and composition.

The substances whose properties and composition have now been briefly stated, result from the sudden application of a red heat to resin. M. Pelletier states, that in a second memoir he will examine the properties of the products obtained from resin at lower temperatures.—*L'Institut*, June, 1837.

From the London Journal.

Report of Transactions of the Institution of Civil Engineers.

SESSION 1837.—January 10.

JAMES WALKER, Esq., F.R.S., L. and E., President, in the Chair.

THE President, having called the attention of the meeting to the conversation on cements which had taken place when they last met, requested Col. Pasley, who had made many extensive experiments on this subject, to give the meeting some account of the results at which he had arrived.

Col. Pasley said, that his attention had been directed to the subject of cements from reading in Smeaton's works that all water limes were composed of carbonic acid clay; since, on dissolving these limes in carbonic acid, clay, of which brick could be made, was left. From this remark he had been led to make experiments similar to the following: he took *two* parts of chalk and *one* of clay. The chalk being pounded and mixed with the clay, balls were formed, which being burnt in a crucible, were ground and mixed as cements usually are. Some of these experiments failed, but he attributed their failure to his having used clay which was coarse and sandy; whence it appears that substances will unite when in the form of a fine powder which will not unite when in a coarser form. These experiments were made in the years 1829, 30, 31, and 32. Subsequently, in 1836, he repeated his more successful experiments, but without the same success; and he attributed their failure to the fact of the clay (the blue clay of the Medway) containing a greater proportion of carbonate of lime than it had contained five or six years before.

Continuing his experiments, he found that four lbs. of dry chalk and five pounds of the moist blue clay, fresh from the Medway, made the strongest cement, but he had determined many other proportions which set immediately under water. With cement made according to the above proportions, thirty-one bricks had been set out from a wall, one brick being added every day, omitting the Sundays.

He had cemented bricks together, and he found in every case that the bricks gave way and not the cement. He estimated the breaking force at the joints at about 5000 lbs. on the thirty-six square inches, the surface of the brick. On comparing the strength of this cement with the chalk mortar which had united some bricks more than thirty years, he was led to consider the adhesive power of his artificial cement forty days' old as at least twenty times the power of the mortar.

January 31, 1837.

W. CUBITT, Esq., V. P., in the Chair.

"Description and Drawing of an Apparatus designed by Mr. Mitchell for Boring Wells; by Mr. Mitchell, Jun., of Sheerness."

This apparatus consists of a frame, similar to that of a pile engine in which the rods are suspended; on one of the rods is a wheel fixed on a square spindle (through which the rod can slide), and turned by means of a pinion and crank; the axis of this pinion serves also to draw the rods, since they may be drawn up by a single rope, or by a tackle suspended to the top of the frame, the rope of the block passing round the winch. The auger is regulated in the cut by a screw and nut; thus the rods are always kept from bending in the hole, and the bore from getting out of the perpendicular. This apparatus is found peculiarly convenient in chalk, and when stones are met with; since in most cases, if the auger be sufficiently hard, the stones flash off in small chips similar to gun flints.

"A Method of breaking Ice by forcing it upwards instead of downwards; practised on the Herefordshire and Gloucestershire Canal in the Winters of 1834-35 and 1835-36; by Stephen Ballard, A. Inst. C.E."

Mr. B. places strong planks covered on their upper side with sheet iron in the front of a boat, so as to form an inclined plane pointing downwards, the lower end of which goes under the ice. The boat, drawn by a horse, is steered by a person walking on the shore with a long shaft attached to a pole projecting over the stern. It is believed that one boat, horse, and boy, would thus break much more ice than three boats worked in the usual manner.

Mr. H. H. Price called the attention of the Institution to the importance of ascertaining what are really the constituent elements of Artificial Hydraulic Mortars and Cements; several memoirs have been read before the Institute of France on this subject, but they exhibit great discrepancies as to the principles of the formation of these cements. It is of the greatest importance to the engineer to know from the materials at hand how to make a cheap average hydraulic mortar.

Col. Pasley remarked, that he considered Smeaton's Researches as the only ones of value; the French philosophers had followed out many of

his suggestions in great detail. Two systems appear to have been pursued in France, the one in which the substances are burnt previously to their being mixed, the other in which they are mixed in a state of minute division previous to their being burnt. The Aberthaw limestone used by Smeaton consisted of carbonate of lime and clay; one part of the lime from this stone and two parts of sand make a cement which sets very hard in time, but the joints must be protected at first by Sheppey or some similar cement.

Mr. Lowe was of opinion that very much must be attributed to the presence of silica; this evidently played a most important part. Limes have exceedingly different qualities; two makers using the same quarry would produce very different limes; if lime is flare-burnt, that is, burnt at a white heat, all the carbonic acid is driven off suddenly; the properties of lime burnt at a slow heat will differ much from the properties of the preceding. The mechanical mixing is also of the greatest importance; the Barrow lime is a natural hydraulic lime, but it must be well beaten with water and silica or sand.

Mr. Blunt, from America, gave, at the request of the Chairman, an account of the system of signals which were employed in the geometrical operations now carrying on in America.

February 7, 1837.

The PRESIDENT in the Chair.

The conversation on artificial cements being resumed, several members expressed their opinions on the causes to which the hardening of mortar was to be referred. Hydrate of lime is the basis of all mortars, but this will not make a water mortar, or cement, without the addition of a metallic oxide. The addition of clay will effect this, but most clays contain a metallic oxide.

Mr. Francis Bramah gave the analysis of Dutch Terras, of Basalts, and of Puzzolana, according to different experimenters; in all these there is a considerable proportion of iron; and the addition of any of these to hydrate of lime will make a water mortar. Thus it appears that we must carefully distinguish between a good mortar, and a good water mortar or cement. Hydrate of lime is the basis of both. Good mortar depends for its excellence on the slow absorption of carbonic acid, and the slow absorption of this is, according to Tennant, the essential condition for good mortar. It is remarkable that, according to Pliny and Vitruvius, the Romans kept their mortar for three years, and it is now the custom among builders to bury mortar, or to keep it in a cellar; it is thus prevented from absorbing carbonic acid from the atmosphere, or, in other words, from being reconverted into limestone. According to some experiments of Tennant, it appears that mortar in $3\frac{1}{2}$ years will regain 63 per cent. of the carbonic acid of which it had been deprived. The absorption of carbonic acid being the condition of mortar hardening, if it be used under circumstances such that this absorption cannot take place, as under water, some other material must be supplied, and the addition of a metallic oxide appears to supply the required element.

With respect to an hypothesis of Kirwan's which had been mentioned, as to the peculiar properties of iron and clay, Mr. J. I. Hawkins stated a singular fact which had come under his own observation, namely, that the rust of iron has a peculiar disposition to travel through moist clay; the rate of this transfer was in one case about one inch per month.

"On Locomotive Engines, and the means of supplying them. By
Jacob Perkins, M. Inst. C. E."

The object of this paper is to show how locomotives may be supplied. The practical defects of the present system of locomotives arising from the furring up or bruising out of the tubes of the boilers, Mr. Perkins proposes that steam should be generated through the medium of surcharged steam. He states, that if a tube hermetically sealed be filled to $\frac{1}{10}$ th of its contents with water, the steam arising from the water will not acquire sufficient elastic force to burst the tube, but will have a remarkable property of transferring heat. The steam being saturated with heat, requires no more, and the tube being vertical, this surcharged steam becomes a floating agent, through which the heat ascends its own levity, so that the *top* of the tube would become red hot, were it not immersed in water. The difference between pure and surcharged steam is, that surcharged steam gives up its heat without condensing it, whereas pure steam must necessarily condense as it parts with its heat. Mr Perkins states, that a boiler has generated steam on this principle under the action of a fervent heat during the last seven months, and without the least leakage or incrustation.

Mr. Perkins then details the advantages which may be gained from the adoption of his principles, and proceeds to make some remarks on the manufacture of locomotives. He recommends the division of labor, that the engines should all be fac-similes, and each part be manufactured at the places best adapted for their production. The paper concludes with observations on the most effective application of steam; on the best velocity of the piston, and relative proportions for the diameter and length of the cylinder.

Mr. Blunt, at the request of the President, then stated some facts respecting the American steamers. The double boats had been given up, and the average speed of the best boats was fifteen miles per hour. One boat, whose length is 220 feet, and breadth eighteen feet, has an average speed more than the preceding. They had recently introduced a ferry boat, which might, he conceived, be extremely serviceable in our rivers; in the Thames for instance, where there are a great number of vessels. The boat had bows at each end, so that it could go either way, and rudders at each end worked by one helm; the boat is thus steered at both ends. The rudders are placed in a semicircular chamber at each end, and can be reversed round; they are worked by a chain passing round the wheel of both and crossing in the middle, so that the boat is brought about in the same direction by the contrary action of the two bows. The wheel and chain cannot get out of order, and the rudder begins below the water, so that the boat can go through the broken ice. Such a ferry boat will go round without going her length, which is about one hundred feet.

Mr. Blunt had repeatedly gone a distance which he knew, from actual trigonometrical measurement, to be seventy-four miles in five hours. The boats completed the distance from New-York to Albany, not less than one hundred and fifty miles, in ten hours. The speed of these boats, as compared with that of the boats in this country, is not to be wondered at, when it is remembered that the boats are built simply and expressly for speed. The Americans pay great attention to the form of their boats: the water is smooth, the engines are placed on the deck and the boilers on the wings; and they spare no expenditure of power provided speed can be obtained.

February 14, 1837.

The **PRESIDENT** in the Chair.

"Description of Mr. Henry Guy's method of giving a true spherical figure to balls of metal, glass, agate, or other hard substance." Communicated by Bryan Donkin, Esq., V. P. Inst. C. E.

The method adopted by Mr. Guy, consists simply in applying to practice the principle, that if a ball can be made to revolve rapidly in every possible direction, or in other words, if during such revolution its axis of rotation be constantly changing its angular position within the ball itself, whilst a grinding tool is applied to the surface of the ball, the most prominent parts of that surface will be first acted on by the grinder, and by continuing the operation the whole of the higher parts of the surface will be progressively ground off, and the ball will ultimately be left of a perfect spherical shape. Mr. Guy effects this by placing the ball betwixt the faces of two wooden chucks fixed to two lathe mandrels, such as are used in common turning lathes, with their axes exactly in a line with each other. A quick motion is given to the mandrels in the usual way by two bands, so applied that the mandrels are placed in opposite directions; the ball being compressed betwixt the chucks turns, notwithstanding the friction of the tool. The tool is a bar of brass or iron, with a conical hole near one end, the larger diameter of which is made a little larger than the diameter of the ball.

"On the Construction of Railways of continuous bearing, by John Reynolds, A. Inst. C. E."

The author states the conditions essential for a good railway to be as follows: 1st. That it should be the closest practical approximation to a perfect plane of perfect stability. 2nd. That it should be adapted to prevent or to neutralise the vibrations from the impact of imperfect cylinders rolling on imperfect planes. 3rd. That it should possess the greatest durability and the greatest facility of being repaired which are compatible with the above conditions. Mr. Reynolds proposes trough-shaped cast iron bearers, having rectangular bearing surfaces, the angular point being downwards. Thus a section of the bearing part of the rail across its length is a right angle, with its vertex downwards. By this peculiar shape the sustaining area is increased, a greater resistance to vertical pressure is consequently obtained, and the lateral stability of the rail is secured. The rails are to be laid in earth, ashes, or broken stone and gravel, and the sustaining surface of the earth may have any requisite density communicated to it by rolling or beating the earth at the sides, so as to give it sufficient density to resist the pressure to which the rail is to be subjected. The mass being composed of materials which will not readily yield or slip away, will be incapable of further condensation by any subsequent pressure not exceeding that to which it had been originally subjected by the beaters or rollers acting at the sides.

The rails which Mr. Reynolds uses are of two kinds; rails wholly of cast iron, cast in one piece, and rails either of wrought or cast iron laid on a sill of wood, the wood being placed in a cast iron bearer of the shape already described. The rails, sills, and bearers in this latter construction, break joint with each other, and are held together by bolts passing through all three. Thus one continuous structure is formed throughout the whole line, and the fracture of the three parts in the same place is highly improbable. The vibrations will be neutralised by the sill of wood acting

as a partially elastic cushion in receiving the concussion to which the rails are subjected; and this latter mode of construction is considered preferable as admitting of the use of either cast or wrought iron rails.

February 21, 1837.

BRYAN DONKIN, Esq., V. P., in the Chair.

The construction of railways on the principle of continuous bearing, as adopted by Mr. Reynolds, and described in his paper read at the last meeting, was discussed. Some of the rails and bearers cast in a single piece, having been laid on Chatmoss, inquiries were made as to how they had answered. It was stated that they were kept in order at less trouble than the others, and that they showed no tendency to sink. It was intended to use the commonest timber for the sills; the wood having been boiled in tar, and allowed to cool in the tar, becomes so saturated with tar that it will not imbibe moisture.

"A Steam Expansion Table, by George Edwards, M. Inst. C. E."

In the paper explanatory of this table, the author remarks, that it has become a matter of interesting inquiry, why the expansive property of steam is as yet so little used, when attention has been directed so much to the economising fuel by improved boilers, and other similar means; and the more so as patents were taken out by Hornblower in 1781, by Watt in 1782, and by Woolf in 1804, for working steam expansively. The objections to the use of high pressure steam may perhaps be an obstacle; but there are many cases, as in the engines of tug boats, to which these objections cannot apply.

Very incorrect notions having existed of the expansive properties of steam, the author has, according to the admitted law, "that (the temperature being constant) the bulk is inversely as the pressure," constructed a table, showing at one view the resulting pressure on the expansion of a given volume of steam of given density, and *vice versa*.

Mr. Edwards then describes the construction and method of using the table, so as to answer at once questions similar to the following:—"Required, the pressure of 50lb. steam when expanded three times its volume." "In a high-pressure engine, working expansively, required the length of the stroke at which to cut off the steam, that the pressure may be 14lb. at the end of the stroke." "In a Woolf's engine, working 54lb. steam, required the capacity of the larger cylinder, the smaller being unity, so that the pressure of the steam shall be 4lbs. on the completion of the stroke of the large piston," &c. &c.

With respect to the principle on which this table is calculated, it was stated that the temperature does not remain constant, and that the pressure falls off most rapidly on the steam being cut off, and reference was made to some experiments made by Mr. John Taylor on this subject.

February 28, 1837.

The PRESIDENT in the Chair.

"On a peculiar form of Rail, and the construction of Railways in America and Germany, by Herman Koehler, of Leipzig, M. Inst. C. E."

The pattern, which the author describes, is by American engineers called the inverted T rail (I), and was introduced in order to avoid trouble and expense, which railways are liable to where the rails are placed in chairs

and fastened with keys. The material used for this need not be of first quality, but in cases where it is expedient to support a general confidence in the quality of the iron, good and sound rails can be made of $\frac{2}{3}$ ths of No. 2, Welsh iron, and $\frac{1}{3}$ ths of No. 3, employing the better quality for the head and bottom, and No. 2 for the stem of the rail, rolled in such manner that the lamina of the iron lie horizontally throughout.

The experience of all railways seems to confirm the opinion that chairs and keys to keep the rails firm to their places are a great and expensive inconvenience, and a dangerous construction whether wood or iron be the material of the keys. The author then details the advantages of the rail, especially if laid on a continuous line of stone or wooden sleepers at a small distance apart.

Wooden railways are at this time used in Germany, and the author has laid 9 miles between Leipzig and Dresden. Wooden sleepers, 8 inches square, are placed upon trenches cut across the embankment at every yard, and filled up with a bed of broken stones, one foot deep. Notches $3\frac{1}{2}$ inches deep are cut into these cross ties to receive the wooden rails of 6 by 9 inches, which are shod with iron plates of one inch thickness and $2\frac{1}{2}$ inches width. At their joints they put together on iron-plates $\frac{1}{4}$ th of an inch thick, to prevent their being pressed into the wood. The rails are wedged firmly to the sleepers by wooden wedges. The head of the spikes with which the iron rails are fastened to the wood are of a conical form, and fit into corresponding holes, these having an elliptical form to prevent the spike from being drawn or bent on the contraction and expansion of the iron rail. The ends of every iron plate rail are fastened with screw bolts, passing through the whole height of the wooden rails, firmly to their places, which is a very important precaution, as the engines are apt to catch the points of the plate rails with their wheel flanges, and to run off.

"A drawing and description of a new Lewis, by Henry Robertson, Glasgow." Communicated by the Author.

The proposed Lewis consists of two pieces of iron, whereof each is a bent lever, connecting at a joint by a strong bolt. When the upper or longer arms are drawn together by the power, the under or shorter arms inserted into the hole are forced against the sides, and by properly increasing the proportion of the upper to the under arm, any necessary power may be given to the instrument.

The advantage of this Lewis, as compared with the one of three pieces in general use are, that it can be inserted into and removed from the hole in far less time; it adapts itself to the form of the hole, all fitting and plugging with slips of iron being unnecessary, and exerting its pressure directly against the sides of the hole, is less apt to chip off the edges and endanger the falling of the stone.

"Experiments on the Strength of various kinds of American Woods exposed to a Transverse strain; by Lieut. Denison, of the Royal Engineers, A. Inst. C. E."

These experiments were undertaken with the view of establishing, first, some common standard of comparison between the woods in general use in that country and in our own; and, secondly, to ascertain the change in strength caused by seasoning. The latter series of experiments, unfortunately, was not made.

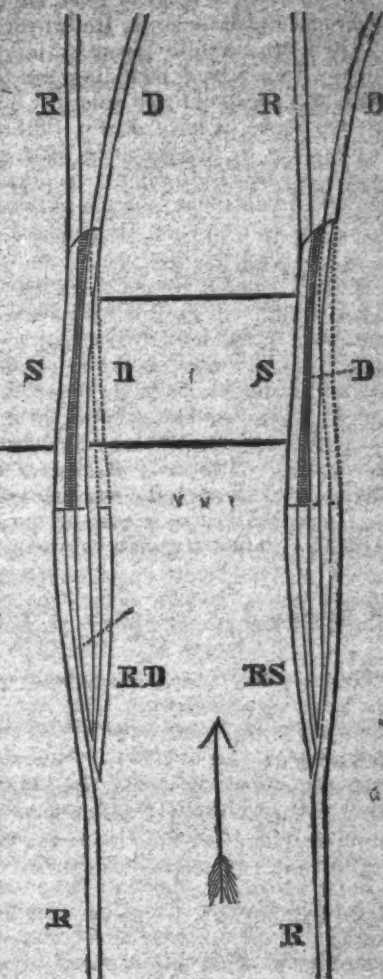
[We copy from the Civil Engineer and Architect's Journal, a London periodical, for March, a description, with an engraving, of "*Curtis's Improved Railroad Switch.*"]

Curtis's Railway Switches.

THE annexed figure shows the Switches so arranged, that an engine can never run off the line, under any conditions of the switch being placed wrong; this object is effected by forming the switches double on both sides, and laying down supplementary rails, *r d*, *r s*, which correspond respectively with the diagonal and straight bars of the switch. Referring to the engraving, if an engine be coming along the line *r*, in the direction of the arrow, it will pass over the diagonal switch and cross the line; if coming along the line in the reverse way, it will pass over the straight bar of the switch and enter the line by means of the supplementary rails, *r s*; if the switch be made to occupy the space shown by the dotted line, and an engine is coming along the line in the direction of the arrow, it will pass straight along the line, and if coming the reverse way along the diagonal line, it will pass along the diagonal switch *d*, and enter the line by the supplementary bars *r d*.

The improved switches represented in page 52, in the last Number, have been at work upon the London and Greenwich Railway for more than twelve months; they have never been out of repair, nor failed in a single instance. The London and Birmingham Railway Company are now laying them down at the various stations upon the line.

1, Stafford-street, Bond-street.



W. J. CURTIS.

Power of Traction of Locomotive Engines.

To E. F. Johnson, Esq., Civil Engineer:

DEAR SIR—In your recent letter to the President and Directors of the New-York and Erie Railroad Company, you have given a table exhibiting the power of traction of Locomotive Engines, at different rates of

speed, and various inclinations of the road—deduced from the formulæ of De Pambour.

I do not doubt the accuracy of the computation of this table. But the formulæ, however, from which it was deduced is erroneous, giving results easily demonstrated to be false, and plainly contradicted by experience, as I hope to show you below.

On the 16th of August, 1834, De Pambour made an experiment on the Liverpool and Manchester Railway with the engine *Vesta*, (the dimensions of which are carefully given by him) which resulted as follows:—The engine drew a load including the tender, equal to 189 tons on a level road, at a speed of three miles per hour. According to the formulæ, the engine ought to have drawn 1061 tons at this speed; thus showing a discrepancy in this instance between the results of the formulæ, and experience of 872 tons; or, in other words, the formulæ gives more than five and a half times as much as the engine can draw at this speed.

This is by no means an insulated case in De Pambour's experiments. It is the greatest discrepancy that exists, and taken on this account, because it exhibits the error more perspicuously; at the same time there is a great difference, in almost every instance, between the experiments and the results of the formulæ.

It would be easy to show wherein the formulæ is wrong—this, however, I design to do in another form hereafter. My present object is to call your attention to a re-examination of the table.

In this table the load for the 13 ton engine on a level road, is 584 tons, at a speed of $7\frac{1}{2}$ miles per hour. If in general we make

M = the load, including the tender, in tons.

n = the friction per ton, of the load, plus additional friction per ton upon engine.

F = the friction of the engine without load.

D = the diameter of the driving wheels.

d = the diameter of the cylinders,

l = the length of the stroke,

and p = the atmospheric pressure per unit of surface;

then $(F + nM) \frac{D}{d \cdot l} + p$ will be the resistance which the load opposes to the motion of the piston.

By substituting the appropriate figures, according to the dimensions of the engine, in place of the letters which represent them in the above formulæ, and expressing the same in units similar to those used for the total pressure of steam in the boiler, the result will be:—

$[162 + (8 \times 584)] \times \frac{54}{(14)^2 \times 16} + 15 = 98.58$ lbs. per unit of surface, or square inch. And this is the resistance opposed to the motion of the piston according to the above formulæ.

You will observe that the total pressure of steam in the boiler, and *a priori* on the pistons, is 70lbs. per square inch. It is plain, that this pressure cannot move them while loaded with a resistance of 98.58lbs. per square inch.

I would here remark that the above formulæ is not precisely correct, inasmuch as no allowance is made for the imperfect application of the engine's power through the crank motion. The error, however, is small, and would, if taken into the computation, show a still greater resistance.

But this formulæ, it is to be believed, abundantly demonstrates the inaccuracy of the table, and is one which probably is familiar to most engineers, certainly to all who have read De Pambour's treatise on Locomotive Engines—for this reason it has been used in this examination.

De Pambour has given a formulæ for determining the maximum load that an engine can move, which is as follows:— $M \times \frac{(P-p) \times d^2 \times l}{n \times D} - \frac{F}{n}$,

where P represents the total pressure of steam in the boiler, and the remaining letters the same as above. This formulæ is also incorrect, for, as may easily be seen, all the elements of the preceding one enter into this, and of course bring with them the errors they there contained.

By substituting figures in the place of the letters which represent them in this formulæ, we have for the maximum load which the 13 ton engine is able to move, $M = \frac{(70-15) \times (14)^2 \times 16}{8 \times 54} - \frac{182}{8} = 376$ tons; and 276

tons for the engine weighing 10 tons: or, in other words, the load given in the table for the engine at $7\frac{1}{2}$ miles per hour, is, according to this formulæ, in one case 55, and in the other 62 per cent. greater than it can move.

These remarks sufficiently illustrate the inaccuracy of the table in these instances. The error being in the formulæ by which it was computed, must of course run through the whole table, although less in degree, as the velocity approximates towards the velocity at which De Pambour's experiments were made.

I have used much frankness in the foregoing communication, under a conviction of the great importance of disseminating nothing but correct information on this subject, and a belief that this alone was your object in the letter referred to—and also, that the confidence placed in De Pambour by Engineers generally, has induced you to make use of his formulæ in this instance, without thoroughly investigating the elements of which it is composed. With much respect and esteem, I am, dear Sir,

Yours, &c.

WM. H. TALLCOTT.

Messrs. Minor & Schaeffer:

GENTLEMEN—Since the publication in your Journal* of a recent letter of mine to the President and Directors of the New-York and Erie Railroad Company, in which I gave a tabular statement of the power of traction of Locomotive Engines, under different velocities, computed from De Pambour's formulæ, I have received the annexed communication from W. H. Tallcott, Esq., Civil Engineer, directing my attention to an error in the table, which at the time of making the computations, owing to the haste in which they were performed, was not noticed.

In estimating the range of power of a locomotive engine, at different velocities, and under a given pressure of steam in the boiler, it is obvious that nothing can be gained in power by reducing the velocity below that point where the pressure of steam upon the square inch in the cylinder is equal, or nearly equal, to the pressure in the boiler.

The formulæ of De Pambour gives under a continued decrease of velocity a continued increase of power, and does not therefore designate the point at which it ceases to be applicable.

This formulæ, although presenting results which perhaps do not vary

* See No. 49, Vol. VI.

greatly from the truth for those velocities at which the experiments were made under the higher pressures, or those ordinarily used, differs more and more widely from the actual results in proportion as there is a greater departure from those velocities, and those pressures.

In computing the table referred to, it did not occur at the moment, that the minimum velocity assumed being $7\frac{1}{2}$ miles per hour, (which was certainly not a *very low* rate of motion) would give results differing as much from the truth, as appears by Mr. Talcott's communication. I was fully aware, from the character of the formulæ, that there would be a variation, but owing, as stated above, to the too great haste in which the table, &c. was prepared, I omitted to test, as I might easily have done, the accuracy of the calculations.

I trust there are none who know me who would believe that I would designedly attempt to mislead, or that I am so obtuse on so plain a proposition in mechanics, as deliberately to assert that a locomotive engine is capable of overcoming a resistance, which when referred to its action on the piston, is *greater* than the opposing force of the steam upon the same pistons.

By referring to the table given in my letter, it will be evident that there is little or nothing gained in power, by reducing the motion down to either of the two lowest rates of velocity there mentioned, since it appears that before reaching those points, the pressure of the steam in the cylinder, must be at its maximum, or nearly so, or otherwise it could not overcome the resistance offered by the load, which the formulæ exhibits as practicable above those rates.

My principal object in presenting the subject in the manner in which I did, was to illustrate some of the general principles involved in the operation of the Locomotive Steam Engine, showing that it possessed a range of power which would enable it, to a certain extent, to accommodate itself to variations in the grade line, simply by a change in the velocity.

As to the accuracy of De Pambour's formulæ within those limits in which it may be considered properly applicable, although I believed it to be nearer the truth than it appears on a more critical examination, yet, I gave it as my opinion that it was imperfect, inasmuch as there were defects "both in the mode of conducting and analyzing his experiments." Not possessing the means of measuring the extent of those defects, and knowing that they would not materially affect the object in view, I preferred giving the results in strict conformity with the formulæ. This course was preferred also that the public, as well as the profession, might understand precisely the ground on which they were obtained.

It may, I think, be questioned, if the full pressure or force of the steam in the boiler was correctly ascertained by any of De Pambour's experiments, whether derived upon the spring balance as corrected, or the mercurial gauge. Whatever difference there might have been in this respect, if any, would serve rather to increase the range of power under the assumed pressure, placing somewhat lower in the scale the greatest velocity corresponding to the maximum load.

The subject of the principles of operation and mode of construction of Locomotive Engines, is one of great importance. De Pambour has done much, very much, towards adding to the stock of knowledge on this subject. His experiments are valuable, but they require to be extended and carefully revised.

I understand from Mr. Talcott, that should he succeed in obtaining

additional facts, with which he hopes to possess himself the coming season, he feels confident that he will be able to present a formulæ which will give results approaching very near the truth for all practicable velocities and degrees of pressure of the steam, &c. The attention he has given to the subject, and his practical knowledge of the management of Engines, will, I doubt not, enable him, with the aid of the experiments and labors of De Pambour, to accomplish more than has yet been effected by those who have heretofore written on the subject.

By giving these remarks, together with Mr. Talcott's communication, an early insertion in your valuable Journal, you will much oblige,

Yours, truly,

E. F. JOHNSON.

Albany, April 7, 1838.

Steamboat Dispatch—Bennet's Boiler.

We have again had the pleasure of making an excursion in the Steam-boat Dispatch built by Capt. Cobb, for the purpose of testing Mr. Bennet's new and striking invention, so frequently alluded to in our columns. The boat has only quite recently been finished, and the proprietors and inventors desirous of giving an opportunity of testing the economy and safety of their machinery, appointed the 13th of June for an experimental trip, to which the members of the American Institute, and several other gentlemen, were invited.

The day selected proved a most auspicious one, and the trip to Sandy Hook and back, a charming sail, affording an agreeable relief from the extreme heat then prevailing in the city.

At half past ten o'clock, the boat left the Battery—as soon as the blowing apparatus was connected, the alternate puffs of steam, smoke, or whatever else it may be called, rolled forth in miniature clouds, and presently in rapid succession. The boat very soon obtained a good headway, and proceeded down the Bay against a strong tide, with much ease. The motion was by no means unpleasant, and every thing connected with the machinery continued to work smoothly and satisfactorily.

To many of the guests the matter was an entire novelty, and the interesting character of the invention arresting the attention of every inquiring mind, it was truly gratifying to observe the pleasure excited by witnessing the operations of the machinery.

It has been a source of much pleasure to us, who have seen the progress of this boat from the first—to observe the ingenuity with which every difficulty has been overcome, and every new obstacle surmounted by Mr. Bennet, who has, through the whole, shown himself to be as enterprising and persevering as he is skilful and ingenious. Those who only see the boilers in their present more complete arrangement, can form no idea of the laborious and tedious steps to be gone through in order to obtain it.

The boat reached a point, about a mile distant from Sandy Hook, in two hours, and then returned.

At this time a very beautiful phenomenon exhibited itself. The wind, by the change in the course of the boat being now astern, the masses of vapor which, issuing at each stroke of the piston, had before been blown rapidly away, now start up in wreaths which, expanding into perfect circles, sailed away, growing larger and larger, and remaining distinct and well defined to a great distance. This most beautiful appearance continued for some time, and was repeated when the wind was again in the proper direction and not too strong. After witnessing the highly gratifying operations of the machinery for more than 25 miles, and enjoying the delightful breeze, which tempered the otherwise almost insupportable heat of the atmosphere, the company organized a meeting. When the officers had taken their seats, a committee was appointed to draw up resolutions indicative of the high satisfaction of the company. Mr. Andrew Williams, in presenting these resolutions, made some very

happy remarks, in which he justly complimented the ingenuity of the inventor, Mr. Bennet, and the enterprise of the proprietors Capt. Cobb and others. The resolutions being unanimously adopted, the Rev. Dr. Cox being called upon, made some very pertinent allusions to the progress of steam navigation. He referred to the remark of Homer, that the ocean had been placed between lands for ever to separate and disconnect them, and that the transit of the ocean might be placed in the same category with a voyage to the moon. Dr. Cox also dwelt upon the mutual assistance of the Arts and Sciences, and upon the moral benefits conferred by their united powers.

On reaching the starting place, it was found that since leaving, just *one cord and one quarter* of wood had been consumed during the trip. The distance in a direct line, to and fro, is called 34 miles—the course taken by the boat being indirect, may make the whole distance nearly 40 miles. This was accomplished in three hours and three quarters.

The almost incredible saving in fuel is the grand point in Bennet's invention. At this rate, the Atlantic may be crossed with a consumption of little more than 100 cords of wood, or its equivalent in coal—the saving in stowage will of course be in proportion. We understand from Mr. Bennet, that the entire weight of machinery and boilers full of water is not quite 70 tons, or actually a *smaller weight than the water alone* in the boilers of the *Great Western*; and it must not be forgotten that the engines of the *Dispatch* are by no means inferior in workmanship or strength. Her cranks, for instance, are of the same weight as those of the *Great Western*—the entire saving of the space occupied by the condensers, air pump, &c. of the latter, being only counterbalanced by the room occupied by the blowing cylinders of the former—leaving a great difference in favor of Mr. Bennet's arrangement.

The boat passed up the river a short distance—flinging around her beautiful garlands of vapor, and finally returned to her place of starting. After the boat was made fast, Mr. Bennet desired the attention of the gentlemen to one of the peculiar advantages of his boiler, viz: the effect of the gases of the fuel, and condensed atmosphere produced by his blowing apparatus. He now removed the slide valve and cap of the *fuel pipe*, when a rush of the condensed air, gas, and smoke contained in the furnace, took place with a tremendous blast for a moment, when all noise ceased. This operation, however, in no wise affected the steam in the boiler or steam chamber, except so far as that, in again starting the boat, the steam then in the boiler would not have the direct and powerful aid of that portion of highly rarified air which the furnace contained when the machinery ceased to move—as, on being relieved from the pressure in the furnace, the "cap valve," which regulates the intercourse between the furnace and boiler, is forced down by the pressure of steam in the chamber, and closes all direct communication between them, until the blowing apparatus and fire have produced a pressure in the furnace sufficient to raise the "cap valve," thereby opening a passage for the gases and smoke into the water, when they become a part and parcel of the steam, or working power; or, in other words, the pressure in the furnace, when the blowing apparatus is in motion, and the combustion rapid, is greater than the pressure in the boiler; consequently, the current is from the furnace into the boiler, but the moment the pressure in the furnace ceases, all communication between them is closed by the pressure in the boiler. The relative pressure is as 45 in the furnace to 44½ in the boiler.

This boat has two boilers—the exterior case of the largest is 14 feet in height, by 5 feet in diameter: the interior case, which forms the furnace, is 9 feet high and 3 1-2 feet in diameter, giving a space of about 11 inches in thickness by 10 feet high for the water; the other boiler is about one quarter less—the large one only was used during this excursion, after the boat was under way.

This construction of boiler is peculiarly calculated for Locomotive Engines, as there is not a particle escaping from the smoke-pipe, or steam pipe, which is not contained in the escape steam; of course those very important appendages, ladies' dresses and gentlemen's eyes, cannot be materially damaged thereby, as is now generally the case when

within a quarter of a mile of the engine. We therefore enjoin it upon Mr. Bennett, to call upon the gentlemen of the Harlem Railroad, and give them an opportunity of testing its peculiar appropriateness for that purpose.

The question has often been asked, and it is a very natural one—how are such results produced by so small a quantity of fuel? The answer is, that by the arrangements of Mr. Bennett's Machinery, he avails himself of the combined power of fire, water and air, and of the latter a very large quantity.

The success of this experiment gave to the gentlemen guests far more satisfaction than the liberal and well arranged entertainment which was spread before them by the proprietors, Capt. Cobb and others; although an unpartaking observer might, in his spleen, have said that the good things on the table, for a time at least, attracted the most attention.

Mr. Bennett gave, with great clearness and politeness, to all who asked, a description of the whole machinery; and even if he is, as observed by a foreign editor on republishing the first brief description from the New-York American, in 1836—"an illiterate mechanic," we do not hesitate to say, that he is a man of uncommon intelligence on this subject, and that the name of PHINEAS BENNET will, in after times, stand conspicuous among the benefactors of his country and of mankind.

We must not, however, in our admiration of the genius which discovered the mode of applying this combination, overlook those gentlemen who had the sagacity to appreciate his worth, and the liberality and moral courage, amidst the sneers of pretending ignorance and self-importance, to aid him in carrying out his plans, by furnishing funds—the want of which has, in many instances, deprived mankind of improvements of incalculable value—and inventors of their just rights and deserved reward. Amongst those who have been conspicuous for their unwavering confidence and liberal aid in carrying Mr. Bennet thus far through his difficulties, we could, if at liberty, name one gentleman of Ithaca, who deserves great credit; but his modesty is equal to his liberality, and his greatest pleasure will be, we are sure, in the success of the man whom he has so liberally aided; and therefore we will not particularize where so many are entitled to a share of praise.

The company, after giving three hearty cheers for the success of the enterprize, left the boat, highly delighted, and as far as we could learn, convinced that this is a matter of the utmost importance, and demanding the serious attention of the community.

Will not some of our enterprising merchants unite in building a *Great Eastern*, able to carry as much merchandize as one of our packets, more passengers, and accomplish the voyage in as short a time as her transatlantic rival, and at infinitely less cost?

The proceedings of the meeting we give below:—

New-York, June 12, 1838.

At a meeting of the invited guests to take an excursion on board the new Steamer Despatch, to test the usefulness and excellence of the recent invention of Mr. Phineas Bennet, in the application of steam, R. Lockwood, Esq. called the meeting to order, and nominated D. Leavitt, Esq. President; and Capt. M. C. Perry and Ruebens Pealo, Esq., Vice-Presidents—Messrs. Joseph Cowdin and Henry A. Wells, Secretaries.

A. Williams, Esq. moved that a committee of five be appointed to report resolutions expressive of the sense of the meeting, whereupon R. Lockwood, A. Williams, R. R. Lansing, T. B. Wakeman, and John T. Griscom, Esqrs. were appointed said committee, and reported the following resolutions, which were unanimously adopted:—

Resolved, That we have witnessed with pride and gratification the present experiment with Bennet's new steam boiler, and from our present personal observation, we deem the invention entitled to high public favor and consideration.

Resolved, That the enterprising inventor, Mr. Bennet, and the indefatigable proprietors, Capt. Cobb, and others of the Despatch, deserve the thanks of the public for their zeal, perseverance and success, as evinced by the present experiment.

Resolved, That as Robert Fulton effected one revolution in navigation by the application of steam power, we deem that Phineas Bennet has this day commenced another of equal promise, by the economy of his mode of generating steam.

Resolved, That the polite invitation and hospitable entertainment of the proprietors on

board their steamer to Sandy Hook, and return, deserve and receive our warmest acknowledgments.

Resolved, That the proceedings of this meeting be published.

The meeting was eloquently addressed by A. Williams, Esq. and Dr. Cox, in which the vast importance of improvements in steam navigation, and the advancement of the mechanical and useful arts of peace were illustrated with happy effect.

JOSEPH COWDIN, }
HENRY A. WELLS, } Secretaries.

D. LEAVITT, Chairman,
M. C. PERRY, Assistant
REUBENS PEALE, Chairmen.

In our next number, we shall refer again to this subject, giving an account of an excursion to the Fishing Banks, on the 19th, and another up the Hudson, on the 22d of June.

Return of the Steamers, Great Western and Sirius.—We have the pleasure of announcing to our readers the safe return of these vessels. The Great Western had a passage out of 14½ days. The passengers all bear testimony to her safety, and to the politeness of the commander, Capt. Hosken. The Great Western left Bristol on the evening of the 2d of June, and arrived here on the morning of the 17th, making the passage in less than 15 days. There seems to have been much enthusiasm excited by the success of the experiment. The Great Western Railroad was opened on the 21st of May—on that occasion "the success of the Great Western Railroad, terminating in New York," was drank.

The *Sirius* arrived from Cork on the 18th of June, having left on the 31st of May.

The entire success of this new enterprise is established. It is said that numerous Steam Navigation Companies are already forming in England.

Hiwassee Railroad.—It is truly gratifying to learn, that in every section of the country the right spirit prevails in relation to works of Internal Improvement. The annexed notice of the Hiwassee Railroad is from the Athens Tennessee Journal, of 30th of May,

"Let any one who doubts the progress of the Hiwassee Railroad, ride along the line from Squire Renfrow's to the Tennessee river; a distance of 33 miles, or one-third of the whole road. He will see several miles completed, and some two or three hundred laborers busily employed in levelling the remainder. It is pleasant to see such energy on the part of the road, and still more so to reflect on the advantages that East Tennessee is to derive from their operations. The pledges of Georgia assure us that she will not let us slacken our exertions; while the relief which we will soon receive from our own State, will enable us to proceed with still greater vigor. The stockholders are catching the spirit from the States, and express their full determination to abide by the cause; a very few only remain in the ranks of opposition, prominent marks for the finger of contempt and pity. A close investigation into the real objects of these few, would serve to place them in a very unenviable light. It would no doubt lead in every instance to private personal interest, in opposition to a noble and generous feeling for the welfare of the public."

A. D.

[[From the Savannah Georgian of the 2d June.]

Central Railroad.—Our readers will have an opportunity this morning of riding twenty-seven miles on this road, and as the locomotive starts from "the depot," they will be saved the former walk. The monument of earth being finished, an excursion is more inviting, Hope to be there.

Civil Engineer and Architects' Journal.—We have received through Mr. Jackson, the agent, 104 Broadway, the first six numbers, or two quarterly parts of the Civil Engineer and Architects' Journal, a new monthly work, published in London, devoted mainly to Internal Improvements, and Architecture, Science, &c. It contains many interesting and useful articles, as we shall frequently give our readers evidence by extracting from its columns, as we have in this number.

We ask particular attention to Advertisements on the cover.

GRAND TURNPIKE LETTING ON THE ZANESVILLE AND MAYS- VILLE ROAD.

*Important to Contractors, Masons, and
Labourers, and well worth their attention.*

Sealed proposals, enclosing recommendations, will be received for the construction of sixty-six miles of the Zanesville and Maysville Turnpike Road, including Graduation, Bridging and Cover, viz: 11 miles in Washington county; 14 in Perry; 19 miles in Fairfield; 11 in Ross; 13 in Adams, and 8 in Brown county, Ohio. By the 30th day of July next, notes, profiles and specifications, for the respective counties will be left, for the inspection of Contractors, with the following persons, who are authorized to receive proposals for their respective parts of the road, viz: Solomon Sturgis in Putnam; Henry Dimes in Somerset; Elnathan Scofield in Lancaster; John Madeira in Chillicothe; A. Hollingsworth in West Union, and E. Campbell in Abertons, opposite to Maysville, Ky.

The Superintendent will attend on the line to read the notes, and make the necessary explanations from Abertons to West Union on July 23d; from Chillicothe to Lancaster on the 26th; from Lancaster to Somerset on the 27th, and from Somerset to Putnam on the 28th, leaving suitable assistants to continue the explanations in his absence, although it is desirable that Contractors attend with the Superintendent on the respective parts. Proposals must be endorsed "PROPOSALS," to distinguish them from letters, and be given in by nine o'clock, A. M. on the days of letting.

The lettings, together with such further explanations as may be convenient, will proceed as follows, to wit:

That part of the road in Washington will be let at Putnam on the 30th of July next.

In Perry, at Somerset, on August 1st.

In Fairfield, at Lancaster, August 3d.

In Ross, at Chillicothe, on August 6th.

And at Abertons, for Adams and Brown, on August 9th.

Contracts will be entered into on the days of letting for the respective counties. The road in the different counties must be proposed for separately. Minor arrangements will be made known at the time.

Labourers, take Notice.

It is intended very promptly to organize a force of one thousand strong upon this road immediately after the letting, so that most of the graduation and bridging may be done this year. The district of country through which this road passes is not surpassed, if equalled, for healthfulness or plentifulness in the United States.

JOHN E. WILLIAMS, Superintendent.
Lancaster, June 14, 1838.

PATENT AGENCY OFFICE AT WASHINGTON.

WILLIAM P. ELLIOTT, Artist, for many years employed in the Patent Office, will devote a portion of his time to the preparation of papers and drawings for applicants for Patents, and attend to the procuring of patents for useful inventions without the necessity of a journey to Washington; and will give information by mail, as to the originality of the same, previous to applying for patents.

All communications must be free of postage. His Office is in room No. 10, Patent Office Buildings, Washington, D. C.

Washington, April 20, 1838.

Jyl-8t

PATENT SAFETY FUSE.

*For Igniting the Charge in Blasting
Rocks, both in dry places and under
water.*

To those acquainted with and accustomed to using the Fuse, comment or description is unnecessary; to those who are not, we would simply observe, that it is an important invention in persons employed or concerned in Blasting, as by its use that hitherto dangerous operation is rendered as safe as the ordinary employment of the Farmer. It insures certainty, and effects an explosion as well under water as in the driest situation, adds much to the force of the blast, and by rendering the priming needle unnecessary, saves much time.

Numerous certificates from those who have tested the Fuse, might be given, but the following is deemed sufficient.

CERTIFICATE.

Having seen the Patent Safety Fuse for Blasting tested to our satisfaction, we cheerfully certify, that we are convinced that it saves much time and labour—adds to the force of the blast—insures certainty, and renders blasting perfectly safe. Besides, it is we think, CHEAPER than the common straw Fuse. For dry blasting it is a great improvement; but for blasting in wet ground, it is invaluable. Messrs. F. HITCHINS & Co., contractors on the Erie canal, certify that they have been engaged in the Cornish mines, England, where the Fuse is exclusively used, and that it has never to their knowledge, caused a miscarriage. They confirm our above expressed opinion of its value. We make no doubt that it will soon be in universal use in blasting operations.

DAVID HAMILTON,

Superintendent repairs, Erie Canal.

W. J. McALPINE,

Assistant Engineer, Erie Canal Enlargement.

J. BOUGHTON,

Engineer Coloco Company.

CONTRA, December 16, 1837.

The Fuse is manufactured by Baron, Bickford, Eales and Co. at Simsbury, Hartford Co., Conn., orders directed to them, or either of their agents, will be promptly attended to.

Agents for selling the Patent Safety Fuse:

David Watkinson & Co., Hartford, Conn.

A. G. Hazard & Co., 135 Front-st., N. Y.

Ernestus Corning & Co., 361 South Market-street, Albany, N. Y.

E. F. & A. G. Smith, 22 Exchange-street, Rochester, N. Y.

H. Kingsley & Co., Buffalo, N. Y.

Curtis & Hand, 16 Commerce-street Philadelphia, Penn.

Praet & Keith, South Charles-street, Baltimore, MD.

G. R. Pecke, Richmond, Va.

W. B. Pecke, Frederickburgh, Va.

SHEET LEAD, &c.

THE Subscribers, Manufacturers of Sheet Lead, Lead Pipe, Red Lead and Litharge—have always an assortment in store, and for sale, at 175 Front Street, corner of Burling Slip.

CORNELL & TUCKER.

Sheet Lead and Lead Pipe for Fortifications and Engineering, Milled any thickness and size to order.

New-York, March 10, 1838.

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RAILWAY IRON, LOCOMOTIVES,

&c. &c.

THE subscribers offer the following articles for sale:

Railway Iron, flat bars, with countersunk holes and milled joints.

350 tons 2½", 16 ft in length, weighing 4½ lbs per

220 " 3 " 4 " " " 3½ " "

" " 4 " 4 " " " 2½ " "

" " 11 " 4 " " " 1½ " "

90 " 1 " 4 " " " 1 " "

with Spikes and Splicing Plates adapted thereto.

To be sold free of duty to State governments, or incorporated companies.

Orders for Pennsylvania Boiler Iron executed. Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels; viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 13 feet 6 inches, to 13 feet 2½, 23, 3, 3½, 34, 34, and 34 inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand Wax.

Also, Patent Hemp Cordage for Inclined Planes and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron, &c. ordered through us.

A. & G. RALSTEN & CO.,
29 F Philadelphia, No. 4 South Front-st.

ARCHIMEDES WORKS.

(100 North Moore-street, N. Y.)

THE undersigned beg leave to inform the proprietors of Rail Roads, that they are prepared to furnish all kinds of Machinery for Rail Roads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Rail Road, none of which have failed. Castings of all kinds, Wheels, Axles and Boxes, furnished at the shortest notice.

H. R. DUNHAM & CO.

New York, February 19th, 1836.

4-yt

FRAME BRIDGES AGAIN.

The subscriber will build Frame Bridges in any part of the United States, Maryland not excepted, and will extend them to as long a span, and warrant them to be as strong, durable, and cheap as those made by any other method.

Having no patent right, he requires no agents. A large number of bridges of his construction are to be seen. Young gentlemen, who wish, can be instructed in the true mathematical principles of building bridges, and the application of the same to practice.

JOHN JOHNSON.

Durkington, Vt., Jan. 1837

MACHINE WORKS OF ROGERS,

KETCHUM AND GROSVENOR, Paterson, New Jersey. The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and dispatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON, WOOL, & FLAX MACHINERY.

Of all descriptions and of the most improved patterns, Style, and Workmanship.

Mill Gearing and Millwright work generally; Hydraulic and other Presses; Press Screws; Callenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR,

Paterson, N. J. or 60 Wall-st. New-York.
Blif

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. E. LONG, to build Bridges, or vend the right to others to build on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Mottawankus river on the Military road in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Paterson Railroad in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesee river at Squakishill, Mount Morris, N. Y. Across the White River, at Hartford, Vt. Across the Connecticut River at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataragus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orons, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the firmest wooden bridge ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG.

Rochester, Jan. 19th, 1836.

4-y

AGENCY.

The subscriber offers his services as Agent, in procuring Machinery for Mills, Steam Engines, Locomotives, Printing Machines, Presses, and other articles.

He will give prompt attention to all orders presented to him for execution; and pledges himself to those who may employ him, that no effort on his part shall be wanting to procure the best articles to be had in the city—and to give satisfaction.

He will also employ Millwrights and Engineers to erect Mills, and put the Engines and Machinery in operation.

Orders accompanied with the necessary funds, or satisfactory city acceptances, should be addressed to D. K. MINOR, 120 Nassau-st.

THE NEWCASTLE MANUFACTURING COMPANY

Continue to furnish at the works situated in the town of Newcastle, Delaware, Locomotives and other Steam Engines—Jack Screws, Wrought-iron work and Brass and Iron Castings, of all kinds connected with Steamboats, Railroads, &c. Mill Gearing of every description; Cast Wheels (built) of any pattern and size, with axles fitted, also with wrought Tires; Springs—Boxes and Bolts for Cars; Driving and other Wheels for Locomotives.

The works being on an extensive Scale, all orders will be executed with promptness and dispatch. Communications addressed to Mr. William H. Burden, Superintendent, will meet with immediate attention.

ANDREW C. GRAY,

President of the Newcastle Manufact'g Co.

Newcastle, Del. March 6, 1838. ly.

NEW ARRANGEMENT.

FOR INCLINED PLANES OF RAILROADS.

The subscribers have formed a co-partnership with the late and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply the inclined planes, of any length required, at short notice, the manufacturing being hitherto carried on by S. S. Durfee & Co. who, in doing by the new firm, the same superlative and machinery are employed by the new firm that were employed by S. S. Durfee & Co. and will be properly attended to, and ropes supplied to any part in the United States.

At New York, 12th, 1836. Hudson, Columbia

ROBT. C. FOLGER.
GEORGE COLEMAN.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States (as well as England, where the subscriber obtained a patent) are found superior to any yet offered in market.

Railroad companies may be supplied with Spikes having constrictions heads suitable to the bolts in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are furnished with Spikes made in the above-named factory—for which reason they are found invaluable, as their admission is more than double any common Spikes made by the hammer.

All orders directed to the Agent, Troy, N.Y. will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N.Y., July, 1831.

Spikes are kept for sale, at factory prices by I & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brown, 222 Water-street, New-York; E. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1838am

H. BURDEN.

NOTICE TO CONTRACTORS.

Auburn and Rochester Rail-Road.

Sealed proposals will be received by the subscriber, until Tuesday, the 3d of July next, at 12 o'clock, noon, at the office of the Company, in the village of Canandaigua, for the Grading, Bridging, and Masonry of the entire line of the Auburn and Rochester Rail-Road.

The line of the road will be located, and the maps and profiles, together with the plans and specifications of the materials, and the manner of construction, will be ready for examination on and after the 20th of June, and may be seen at the city of Rochester, the villages of Canandaigua, Geneva, and Seneca Falls, where the Resident Engineers will be in attendance, to give any information relative to the work, and will furnish blank proposals.

No transfer of Contracts will be recognized. Persons proposing for more work than they wish to contract for, must specify the quantity they desire to take.

The subscriber reserves the right to accept the proposals for the whole or any part of the work.

H. HIGHAM,

Chief Engineer A. & R. Rail-Road.

Having resumed the publication of the *Journal*, under circumstances which induce us to believe that we shall be able to continue it without further interruption, we solicit for it the attention of all who are engaged upon, or interested in, *works of Internal Improvement*. Whether the *Journal* has heretofore contributed much, little, or nothing, to the great cause of intercommunication, is not for us to say; we may, however, be allowed to observe, that there is much yet to be done to develop the resources of the Union, and that in no other way can as much be accomplished as through the means of Railroads and Canals—therefore, any publication devoted mainly to those important subjects, is entitled to the countenance and support of all interested in their success—AND WE ASK UNHESITATINGLY FOR SUCH SUPPORT.

N. B. Postmasters and Editors of newspapers with whom we exchange, are desired to receive subscriptions for the *Journal and Magazine*, and to remit the amount by mail, at our risk; and on the receipt of the money, the *Journal and Magazine* will be forwarded.

Subscribers indebted to us for past volumes, are requested to remit the amount by mail without delay, and for the ensuing year also, if they desire to have it continued.

MISSING NUMBERS.—Subscribers desiring to obtain missing numbers of previous volumes, will do well to apply soon.

TO ENGINEERS, DISSECTORS AND CONTRACTORS.—The Editors of the *Journal and Magazine* are particularly desirous to receive information in relation to the present condition of each Railroad and Canal in the Union; as well of those in use, as of those in course of construction, and they respectfully request gentlemen in possession of, to communicate at an early period, the desired information.

We ask the attention of contractors to the following notice of the Central Rail-Road Company of Georgia.

NOTICE TO CONTRACTORS.

Central Rail-Road of Georgia.

Sealed proposals will be received at the office of the Engineer in Savannah until the 1st day of August next, for grading twenty-one miles of this road from the western end of the present contract to the Ogeechee river, being one hundred miles from this city. The work will be divided into sections of three miles each, and plans and profiles ready for inspection after the 15th of July. Further letting, including a bridge over the Ogeechee River, will take place soon after the above.

L. O. REYNOLDS, Chief Engineer.

Savannah, June 24, 1839.

NOTICE.—To all whom it may concern.

The undersigned gives notice that he has invented a useful improvement in the construction of Railroad Car wheels, which has been tried for several months on the Beaver Meadow Railroad. The undersigned was preparing to take out a patent in the same, when a certain Henry Moore, who has been instructed by the undersigned and employed for some time in casting said wheels, surreptitiously made a casting from his model, and secretly dispatched a messenger to Washington to obtain a patent for himself, which the undersigned is informed the said Moore has done, and is offering rights for sale. Now this is to notify all persons to beware of purchasing rights under said patent, as the claim of said Moore will be instantly contested before the proper tribunals of justice.

HOPKIN THOMAS.

Beaver Meadow, March 26, 1839. 3yt—3

List of Subscribers who have paid since our last publication; showing the date to which the account is paid.

W. H. Canfield, Syracuse, N. Y.	July 1, 1839	E. H. Cox, New Lisbon, Ohio	Dec. 1, 1838
J. N. Grant, Detroit, Mich.	July 1, 1839	Robert Clark, Andover Mass.	June 1, 1839
Geo. McCormick, Ithaca,	July 1, 1839	R. M. Brewster, Sandusky, O.	July 1, 1839
C. N. Haguer, Washington, D. C.	July 1, 1839	Geo. Johnston, New York,	July 1, 1839
L. Bond, New Haven Conn.	July 1, 1839	L. P. Thomas, do.	July 1, 1839
T. P. Hager, Phoenixville, Pa.	July 1, 1839	Thomas G. Conklin, do.	July 1, 1839
John Levensing, Williamsport, Pa.	July 1, 1839	W. L. Moore, Bellefonte, Pa.	July 1, 1839
S. DeLeon, Baltimore,	July 1, 1839	C. H. Davis, Wilmington, N.	May 1, 1839
Tiger Navig. Co., Blomberg, Pa.	July 1, 1839	E. Chubb, Marshall, Illinois	July 1, 1839
E. Morris, Hancock Co. Md.	March 1, 1839	Charles Whilock, do.	July 1, 1839
W. M. Eddy, Genesee Co. N. Y.	May 11, 1839	Abner Brand, do.	July 1, 1839
J. E. Kirkwood, New London Conn.	July 1, 1839	J. G. Matthews, do.	July 1, 1839
J. C. Troutman, Athens, Tenn.	July 1, 1839	Calvin Benjamin, Vandalia, do.	July 1, 1839
W. P. Elliot, Washington, D. C.	July 1, 1839	R. W. Martin, York, Pa.	July 1, 1839
E. M. Taylor, Brent Creek, Va.	July 1, 1839	Henry Wing, Dixon's Ferry, Ill.	July 1, 1839
H. J. Davis, do.	do.		
University of Va. Charlottesville Va.	June 1, 1839		
James Laurie, Norwich Conn.	July 1, 1839		

Omitted in previous report.

John A. Rensselaer, Albany, July 1, 1839.